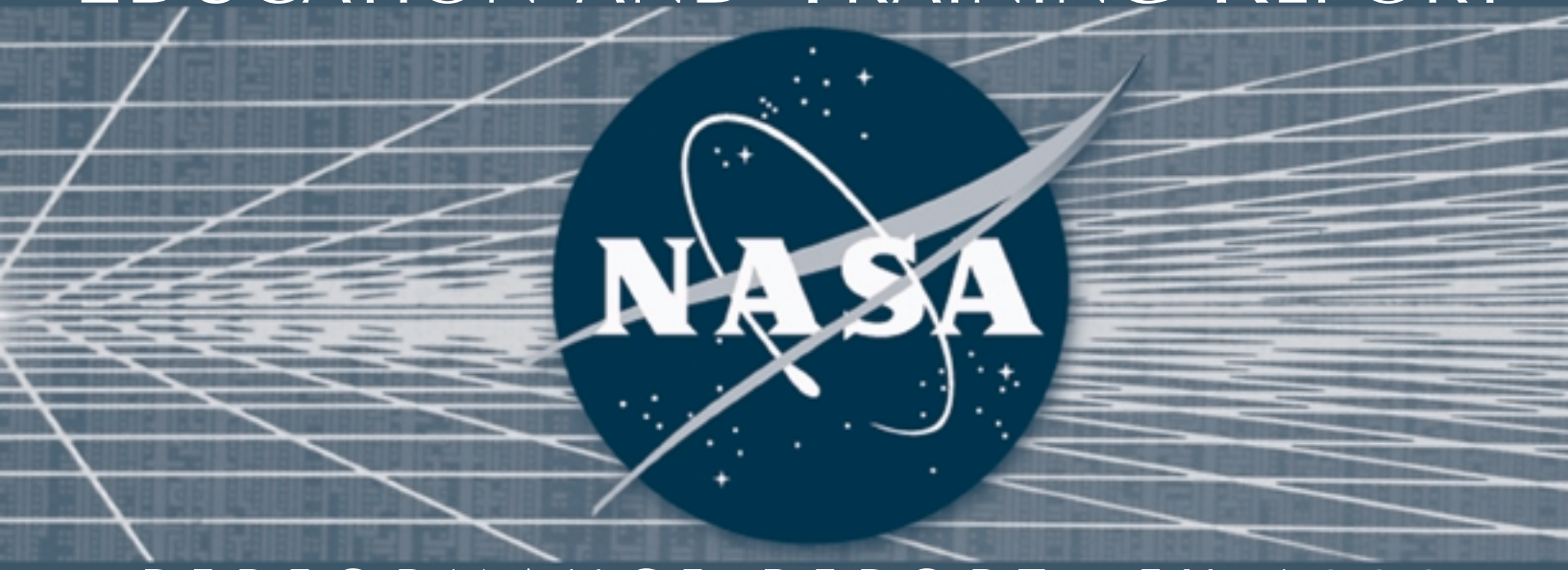
EDUCATION AND TRAINING REPORT



PERFORMANCE REPORT—FY 1998

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
OFFICE OF EQUAL OPPORTUNITY PROGRAMS
MINORITY UNIVERSITY RESEARCH
AND EDUCATION DIVISION

Acknowledgments

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Foreword

For more than 40 years, the National Aeronautics and Space Administration (NASA) has been involved in national efforts to increase access to careers in mathematics, science, engineering, and technology. NASA's commitment to education and improving the public's understanding of science was mandated by the National Aeronautics and Space Act of 1958. More recently, NASA has committed this mandate into its Strategic Plan to "involve the educational community in our endeavors to inspire America's students, create learning opportunities, and enlighten inquisitive mind" and to "communicate widely the content, relevancy, and excitement of NASA missions and discoveries to inspire and to increase understanding and the broad application of science and technology." This report highlights a number of education and training programs that are supported by NASA in an effort to provide meaningful opportunities for underserved and underutilized groups.

NASA education and outreach programs are committed to establishing an atmosphere and environment of equal opportunity. The Agency views this commitment as an urgent matter of national self-interest given the profound changes in the composition of the population of the United States. It is committed to the true and meaningful participation of undeserved/underutilized groups through educational initiatives that are based on NASA Research Announcements that have explicit goals and evaluation criteria. They include significant opportunities for the participation of minority institutions, including Historically Black Colleges and Universities (HBCU), Hispanic-Serving Institutions (HSI), and Tribal Colleges and Universities (TCU).

Projects span the spectrum of the educational enterprise, from kindergarten through postsecondary education and beyond to specialized teacher training. The general aim is to increase the participation and achievement of targeted students in mathematics, science, engineering, and technology disciplines. The report illustrates the broad array of education and training projects supported by the NASA Office of Equal Opportunity Programs, Minority University Research and Education Division, in collaboration with NASA Strategic Enterprises and NASA Centers.

It is our hope that this report will encourage more underserved/underutilized groups to participate in NASA education and outreach activities.

George E. Reese
Associate Administrator for
Equal Opportunity Programs

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Overview

NASA employs a comprehensive and complementary array of strategies to increase the number of underserved/underutilized groups, including disadvantaged and/or disabled students pursuing mathematics, science, engineering, and technology studies. These strategies include:

1. Working closely with NASA Strategic Enterprises, other Government agencies, and interested parties to develop new research and education collaborations and partnerships to build infrastructure in NASA-related research areas

2. Providing annual opportunities for Historically Black Colleges and Universities (HBCU) and Other Minority Universities (OMU) to participate in compzetitive peer review and merit selection processes for research and education awards

3. Encouraging and providing opportunities for faculty to conduct NASA research early in their careers

4. Providing incentives for students to enter and remain in mathematics, science, and technology disciplines

5. Developing and implementing evaluations to assess the effectiveness of the programs and to improve program delivery and results

NASA Strategic Enterprises and Program Offices continue to contribute financially and technically to the success of the Minority University Research and Education Program (MUREP). In FY 1998, they made $20.8 million available to support competitively selected research awards at HBCU's ($12.8 million) and OMU's ($8.0 million). In addition, more than 98 technical personnel from across the Agency were involved in onsite reviews, informational forums, and the provision of onsite research activities for faculty and students from HBCU's and OMU's at NASA Centers and the Jet Propulsion Laboratory (JPL), a contractor-operated NASA facility.

A key priority for NASA MUREP has been to move from collecting data just on individual grant awards to establishing key outcomes and collecting relevant data on HBCU and OMU research and education activities to measure progress in achieving those outcomes. The data are collected electronically using the Internet and a single annual collection timeframe, which, this year, includes activities that were conducted in academic year 1997 through the summer of 1998. The data provide information necessary for comparative assessments of HBCU and OMU projects, as well as for annual MUREP performance reports, including those required by the White House Initiative Offices on HBCU's, Educational Excellence for Hispanic Americans, and Tribal Colleges and Universities (TCU). Two instruments are used—one for basic research awards and the other for education and training awards. This report reflects the data collected for education and training programs. It is intended to reflect the impact of MUREP on the scientific and technological base for NASA and the Nation.

Overview

The information collected is presented in a uniform set of metrics that measure the following:

- Participants
  - Students, teachers supported
- High School Student Outcomes
  - Enrollment in mathematics, science, education, and technology (MSET) course,graduation, enrollment in college, and selection of MSET majors
- Bridge Student Outcomes
  - Completed freshman year in college
- Undergraduate and Graduate Student Outcomes
- Degrees awarded, postgraduation plans
- Teacher Outcomes
  - Received certificates

Two hundred forty-one (241) grants (see Appendix A) were considered in generating this report. The data constitute more than 80 percent of the programs funded by the Office of Equal Opportunity Programs. However, this information only reflects about half of NASA-funded initiatives with minority institutions. The data include reports from minority institutions with Institutional Research Awards (Network Resources and Training Sites), Precollege Awards in MSET programs, Bridge Programs for high school students beginning their undergraduate work in MSET areas of study, Scholars Programs at the undergraduate and graduate levels, and Teacher Preparation Programs for both preservice and inservice teachers. In addition to the award categories above, the Office of Equal Opportunity Programs has initiated a new program of Partnership Awards to "expand opportunities and enhance diversity in the NASA sponsored research and education community"; the new partnerships are designated as "PAIR Awards."

NASA Headquarters program offices, NASA Centers, and JPL support MUREP through direct funding, the use of their facilities, and the commitment of their personnel to serve on technical review committees and assist in other facets of program implementation. Numerous students and Principal Investigators (PI) spend time onsite at the various NASA Centers and JPL throughout the year.

Overview

Measures of Performance

Table 1 and Table 2 reflect the data for those grants that reported uniform outcome statistics for September 1997 to September 1998.

Table 1. MUREP Awards by Type of Institution

Type of Program	Number of Awards	Number of Participants	NASA Funding
HBCU	58	12,762	$11,978,422
OMU	44	20,520	6,576,573
HSI	20	18,241	4,055,760
TCU	4	1,726	513,516
Other	20	553	2,007,297
Total	102	53,802	$25,131,568

Table 2. MUREP Awards by Type of Institution

Type of Program	Number of Awards	Number of Participants	NASA Funding
Precollege	23	23,209	$11,453,087
Bridge	9	195	1,847,216
Scholars/ Fellows	11	257	1,769,745
Teacher Training	18	1,789	3,781,217
PACE	18	3,353	1,857,487
National Resources and Training Sites (NRTS)	7	9,567	1,393,725
Other	16	15,432	3,029,091
Total	**102**	**53,802**	**$25,131,568**

Overview

High School Student Outcomes (see Table 3)

- Five thousand eight hundred sixty-one (5,861) high school students selected college preparatory MSET courses: 2,258 African Americans, 2,148 Hispanics, 585 Native Americans, 99 Pacific Islanders, and 771 other underserved and/or underutilized students. There were an additional 134 students with disabilities who selected college preparatory MSET courses.

- Five thousand nine hundred eighty-eight (5,988) high school participants graduated from high school: 774 African Americans, 570 Hispanics, 181 Native Americans, 20 Pacific Islanders, and 4,443 other students from underserved/ underutilized schools. There were an additional 34 participants with disabilities who graduated from high school.

- Four thousand eight hundred ninety-five (4,895) high school students enrolled in college: 570 African Americans, 424 Hispanics, 91 Native Americans, 17 Pacific Islanders, and 3,793 other underserved and/or underutilized students. There were 6 participants with disabilities who enrolled in college.

- Two thousand five hundred and one (2,501) high school graduates selected MSET curriculums in college: 322 African Americans, 93 Hispanics, 50 Native Americans, 5 Pacific Islanders, and 2,031 other underserved and/or underutilized students. There was also 1 high school graduate with a disability who selected MSET curriculums in college.

Table 3. High School Student Outcomes (All Institution and Program Types)

	U.S. Citizens Who Are:								Subtotal		Other Unknown		Total	Individuals with Disabilities
	African American		Hispanic		Native American		Pacific Islander							
	M	F	M	F	M	F	M	F	M	F	M	F		
Total Number of Participants	4,918	7,280	2,241	2,607	657	822	69	85	7,885	10,794	3,006	3,576	26,788	88
Number of Students Who Selected College Preparatory MSET Courses	1,062	1,196	968	1,180	197	388	42	57	2,269	2,821	373	398	5,861	134
Number of Students Who Progressed to Next Level of Mathematics	935	1,058	1,325	1,489	210	400	54	60	2,524	3,007	403	413	6,347	154
Number of Students Who Graduated From High School	351	423	273	297	94	87	9	11	727	818	4,362	81	5,988	34
Number of Students Who Enrolled in College	250	320	178	246	35	56	6	11	469	633	3,737	56	4,895	6
Number of Students Who Selected College MSET Courses	168	154	58	35	19	31	4	1	249	221	2,025	6	2,501	1

Overview

Bridge Student Outcomes (see Table 4)

- One hundred ninety-five (195) students participated in Summer Bridge Programs during the summer of 1998: 158 African Americans, 10 Hispanics, 21 Native Americans, 5 Pacific Islanders, and 1 other student from an underserved/ underutilized school.

- One hundred seventy-one (171) students who participated in 1997 Summer Bridge Programs successfully completed their freshman year of college: 129 African Americans, 11 Hispanics, 21 Native Americans, 5 Pacific Islanders, and 5 other students from underserved/underutilized schools.

- Nine hundred seventy-eight (978) students who have participated in NASA Summer Bridge Programs have successfully transitioned from freshman to sophomore status.

Table 4. Bridge Student Outcomes (All Institution and Program Types)

	U.S. Citizens Who Are:								Subtotal		Other Unknown		Total	Individuals with Disabilities
	African American		Hispanic		Native American		Pacific Islander							
	M	F	M	F	M	F	M	F	M	F	M	F		
Total Number of Participants	58	71	1	1	0	0	0	0	59	72	0	0	131	0
Number of Participants in Prior Year Summer Bridge Programs	84	74	8	2	9	12	3	2	104	90	0	1	195	0
Number From Prior Year Summer Bridge Programs Who Entered College MSET Courses	73	56	7	2	9	12	3	2	92	72	4	4	172	0
Number of Students From Prior Year Who Successfully Completed Freshman Year	63	66	8	3	9	12	3	2	83	83	4	1	171	0
NASA Bridge Student Rate of Retention From Freshman to Sophomore	280	292	103	100	0	0	101	100	484	492	1	1	978	0
University Overall Rate of Retention From Freshman to Sophomore	96	197	1	1	0	0	1	59	98	257	2	3	360	0

Undergraduate Student Outcomes (see Table 5)

- One hundred fifty-two (152) students were awarded bachelor's degrees: 81 African Americans, 49 Hispanics, 8 Native Americans, 3 Pacific Islanders, and 11 other students from underserved/underutilized schools.

- Ninety-four (94) of the students awarded degrees have indicated they will continue their full-time studies toward the next degree: 36 African Americans, 22 Hispanics, 29 Native Americans, 1 Pacific Islander, and 6 other students from underserved/underutilized schools.

- Thirty (30) of the students awarded degrees have accepted full-time employment in a NASA-related field and are continuing to work toward the next degree: 18 African Americans, 10 Hispanics, 1 Native American, and 1 Pacific Islander.

- Forty-three (43) of the students awarded degrees have accepted full-time employment in a NASA-related field and currently do not plan to pursue the next degree: 27 African Americans, 12 Hispanics, 2 Native Americans, 1 Pacific Islander, and 1 other.

Table 5. Undergraduate Student Outcomes (All Institution and Program Types)

	U.S. Citizens Who Are:								Subtotal		Other Unknown		Total	Individuals with Disabilities
	African American		Hispanic		Native American		Pacific Islander							
	M	F	M	F	M	F	M	F	M	F	M	F		
Total Number of Participants	1,232	1,478	145	130	29	36	22	28	1,428	1,672	67	60	3,227	20
Degrees Awarded	44	37	25	24	2	6	2	1	73	68	7	4	152	0
Postdegree Plans of Degree Recipients														
Number Continuing Full Time For Next Degree	21	15	12	10	13	16	1	0	47	41	3	3	94	0
Number Employed Full Time in NASA-Related Field and Currently Not Pursuing Next Degree	10	17	8	4	0	2	1	0	19	23	1	0	43	0
Number Both Working Full Time in NASA-Related Field and Continuing for Next Degree	7	11	4	6	1	0	1	0	13	17	0	0	30	0
Unknown	13	5	5	6	0	0	0	1	18	12	1	0	31	0
Other	4	1	0	0	0	0	0	0	4	1	0	0	5	0

Graduate Student Outcomes (see Table 6)

- Twenty-four (24) students supported by NASA Education and Training MUREP funds were awarded graduate degrees: 10 African Americans, 6 Hispanics, 2 Native Americans, 2 Pacific Islanders, and 4 others.

Teacher Outcomes—Preservice (see Table 7)

- Forty-two (42) of the 451 preservice teachers impacted by NASA MUREP programs were awarded degrees: 15 African Americans, 18 Hispanics, and 9 others.

- Forty-six (46) preservice teachers were certified: 8 African Americans, 34 Hispanics, 1 Native American, 1 Pacific Islander, and 9 others.

- Eighty-three (83) preservice teachers were employed by hard-to-staff schools: 13 African Americans, 53 Hispanics, 5 Native Americans, 3 Pacific Islanders, and 9 others.

Table 6. Graduate Student Outcomes (All Institution and Program Types)

	U.S. Citizens Who Are:								Subtotal		Other Unknown		Total	Individuals with Disabilities
	African American		Hispanic		Native American		Pacific Islander							
	M	F	M	F	M	F	M	F	M	F	M	F		
Total Number of Participants	13	21	20	31	5	5	5	3	43	60	11	11	125	3
Degrees Awarded	5	5	2	4	1	1	0	2	8	12	3	1	24	0
Postdegree Plans of Degree Recipients														
Number Continuing Full Time For Next Degree	0	0	1	2	0	1	0	0	1	3	2	1	7	0
Number Employed Full Time in NASA-Related Field and Currently Not Pursuing Next Degree	0	0	8	16	3	1	0	0	11	17	1	0	29	0
Number Both Working Full Time in NASA-Related Field and Continuing for Next Degree	0	0	0	2	0	0	0	0	0	2	0	0	2	0
Unknown	0	0	0	0	0	0	0	2	0	2	0	0	2	0
Other	4	0	0	0	0	0	0	0	4	0	0	0	4	0

Table 7. Teacher Outcomes—Preservice (All Institution and Program Types)

	U.S. Citizens Who Are:								Subtotal		Other Unknown		Total	Individuals with Disabilities
	African American		Hispanic		Native American		Pacific Islander							
	M	F	M	F	M	F	M	F	M	F	M	F		
Total Number of Participants	32	73	39	199	18	22	2	3	91	297	27	36	451	0
Degrees Awarded	7	8	9	9	0	0	0	0	16	17	4	5	42	0
Number Receiving Certification	2	6	7	27	1	0	1	0	11	33	1	1	46	0
Number Pursuing Further Degree	4	5	7	16	2	4	1	3	14	28	6	8	56	0
Number Employed in Hard-to-Staff Schools	6	7	19	34	2	3	1	2	28	46	4	5	83	0
Number Employed in Other Than Hard-to-Staff Schools	2	6	4	7	1	0	0	0	7	13	1	1	22	0

Overview

Teacher Outcomes—Inservice (see Table 8)

- One hundred ninety-five (195) of the 1,338 inservice teachers impacted by NASA MUREP programs received certification: 103 African Americans, 40 Hispanics, 6 Native Americans, 1 Pacific Islander, 1 disabled individual, and 45 others.
- Thirty-four (34) inservice teachers were awarded a master's degree: 19 African Americans, 7 Hispanics, and 8 others.
- Three hundred and ten (310) of the participating inservice teachers were employed by hard-to-staff schools: 116 African Americans, 122 Hispanics, 3 Native Americans, 6 Pacific Islanders, 1 disabled individual, and 68 others.

Table 8. Teacher Outcomes—Inservice (All Institution and Program Types)

	U.S. Citizens Who Are:								Subtotal		Other Unknown		Total	Individuals with Disabilities
	African American		Hispanic		Native American		Pacific Islander							
	M	F	M	F	M	F	M	F	M	F	M	F		
Total Number of Participants	294	728	60	351	12	26	3	12	369	1,117	175	319	1,980	3
Number Receiving Certification	23	80	15	25	3	3	0	1	41	109	22	23	195	1
Number Receiving Master's Degree	5	14	2	5	0	0	0	0	7	19	3	5	34	0
Number Employed in Hard-to-Staff Schools	34	82	31	91	0	3	1	5	66	181	25	38	310	1
Number Employed in Other Than Hard-to-Staff Schools	38	112	11	22	0	0	1	1	50	135	26	46	257	3

Events and Activities (see Table 9)

- Five hundred and ten (510) faculty-level investigators were involved in NASA-related education and training awards: Institutional Research Awards (Network Resources and Training Sites): 59 research associates, 5 postdoctorate researchers, and 574 nonstudent investigators.
- Thirty-three (33) refereed papers and/or book chapters were published involving 15 student authors or co-authors, and an additional 26 have been accepted for publication, but not yet published, including 13 student authors or co-authors.
- Students and nonstudent investigators at the 10 NASA Centers, including JPL, conducted 189 presentations.

Overview

- Two hundred and twenty (220) student and nonstudent investigators participated in national and international MSET conferences.
- One hundred fifty-six (156) faculty seminars were conducted by the NASA MUREP grantees.
- Nineteen (19) faculty members participated in NASA MUREP events and an additional 33 events sponsored by other NASA offices.
- Sixty-six (66) participants attended events sponsored by other agencies.

The 1998 Education and Training Report includes outcome reports and narrative reports submitted for FY 97–98 describing the individual projects, their objectives and outcomes, and, in many instances, the enrollment data from the schools impacted by the program. In most of the K–12 programs, the impact is broad based and focused on information and curriculum development rather than one-on-one contact or individually based programs. The Scholars Programs and Teacher Enhancement Programs, however, reflect more individually based initiatives. This report is intended to illustrate the types of programs funded by NASA and reflect their outcomes.

Table 9. Outcomes—Events and Activities

Nonstudent Investigators	
Faculty	510
Research Associates	59
Postdocs	5
Total Nonstudent Investigators	574
Refereed Papers and/or Book Chapters (Only Publications That Acknowledge the NASA MUREP Awards)	
Published	33
Number of Student Authors/Co-Authors	15
Accepted But Not Yet Published	26
Number of Student Authors/Co-Authors	13
Presentations Given	
At NASA Installations	189
At National and International Conferences	220
Number Given by Students	276
Faculty Seminars	156
Panels (Advisory, Peer Review, Science Working Group) Served on	
For NASA MUREP	19
For Other NASA	33
For Other Agencies	66

Precollege Programs

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The focus of this section is on Precollege Programs. During FY 1998, MUREP awarded $8,680,930 to 47 colleges, universities, and nonprofit organizations. These awards supported educational outreach projects designed to expose precollege and prefreshman students to courses based on MSET, enrichment opportunities, and career options. Students specifically targeted included African Americans, Hispanics, Native Americans, Pacific Islanders, individuals with disabilities, and other students from underserved/underutilized school districts. NASA's MUREP targets minority institutions of higher education and organizations serving large numbers of underserved/underutilized groups as a major part of the community base used to meet the Agency's Federal mandates for HBCU's, HSI's, and TCU's.

In addition, the recognition by Government, Congress, and the Nation of the continuing ineffectiveness of the K–12 education system, particularly in the MSET disciplines, has served to crystallize NASA's efforts in this area. While the emphasis has always been to serve as an opportunity to prove the efficacy of the projects proposed, many projects continue to receive sole or partial funding from NASA to meet the following program goals:

- Increase the number of disadvantaged students in public schools, with predominant enrollments of the targeted group, who graduate from high school with the technical skills, knowledge, and interest required to successfully pursue MSET study at the undergraduate level
- Improve mathematics, science, and technology literacy among disadvantaged middle and high school students who are enrolled in public schools with predominant enrollments of the targeted group
- Increase the number of students who are fully prepared to enroll in challenging college preparatory MSET courses in secondary school and successfully advance to the next academic level without the need of remediation
- Heighten students' awareness, interest, and understanding of MSET in the world around them, career options in MSET-based fields, and the academic preparation necessary to pursue these careers; expose students to role models, mentors, and a broad range of participatory activities and advanced technology that enhance MSET learning, experimentation, and research
- Increase the involvement of parents of participating students to enhance participation and support of their children's education and academic and career decision-making processes

MUREP's Mathematics and Science Awards focus on strengthening the capacity of minority institutions to provide excellence in MSET training while increasing the participation and achievement of underserved/underutilized and disadvantaged students in MSET fields at all levels of education. MSET awards contribute to the

Precollege Programs

national education goals by supporting educational outreach projects that increase the number and strengthen the skills, knowledge, and interest of students in mathematics, science, and technology-based academic programs. MSET awards, which consist of both unsolicited awards and solicited awards, such as the NASA Precollege Awards for Excellence in Mathematics, Science, Engineering and Technology (PACE/MSET), will accomplish the following:

- Provide students with the necessary academic preparation and motivation to successfully complete challenging college preparatory MSET courses
- Heighten students' interest and awareness of career opportunities in MSET fields
- Expose students to the NASA mission, research, and advanced technology through role models, mentors, and participation in research and other educational activities

The strategies used by NASA also include partnerships with such organizations as the NASA Glenn Research Center at Lewis Field/Cuyahoga Community College Science, Engineering, Mathematical and Aerospace Academy (SEMAA); the NASA MUREP/Hispanic Association of Colleges and Universities Proyecto Access; the NASA Marshall Space Flight Center/ Southeastern Consortium for Minorities in Engineering (SECME); the NASA MUREP/American Indian Science and Technology Education Consortium (AISTEC); and a number of others that have evolved from unsolicited proposals to competitive peer-reviewed and merit-based selections from NASA Research Announcements for Institutional Research Awards (Network Resources and Training Sites), Partnership Awards for Education, and PAIR Awards.

Non-PACE Programs

Alabama A&M University
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Recruitment

Aggressive recruitment efforts have been an ongoing project of the F.A.S.T. (Future Assets Student Talent) Director over the past 6 months. Seventy-three high school and middle schools in the north Alabama area have been located and targeted for the program. As of September, 22 schools have been visited, yielding 18 new members within the Huntsville City and Madison County school districts. A minimum of 20 contacts is maintained on a monthly basis to area schools and administrators.

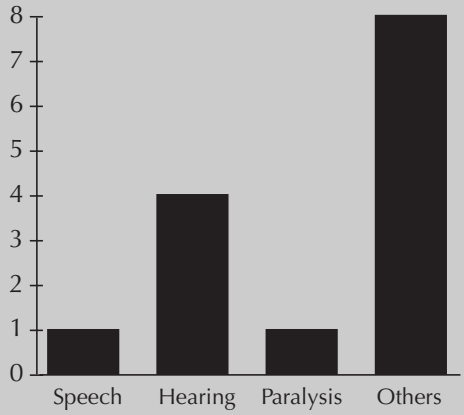
Workshops

Two in-house workshops—"Conduct in the Workplace" and "Etiquette in the Workplace"—were held with the summer interns on June 30 and July 29, 1998. Students were briefed on the roles that played in the work environment and how people are to conduct themselves in that environment. Communication with co-workers and supervisors was discussed, along with conflicts and conflict resolution. As an open forum, these workshops provided the students with an outlet to voice their opinions, their concerns and to offer suggestions to one another. The lunchtime workshops also served as an informal gathering for the students to talk with one another about their aspirations, goals, accomplishments, and varied backgrounds.

Site Visits

Site visitations began April 21, 1998, at O. Johnson High School in Huntsville, Alabama. The Assistant Principal spearheaded the initial meeting, which was attended by six resource teachers. The purpose of the visitations is to introduce schools that are not familiar with or have had no previous contact in the past with F.A.S.T. to the benefits of a partnership with the program. Since the first visitation, Johnson High School has been visited on three separate occasions. A total of 67 students were introduced to the program within a 6-week period. Other schools taking part in the F.A.S.T. initiative to bring technology awareness and exposure to their school system and to their students are Hazel Green High School, Hazel Green Middle School, Lee High School, S.R. Butler High School, Stone Middle School, Davis Hills Middle School, Edward White Middle School, Hartselle High School, and the Alabama School for the Deaf and Blind.

F.A.S.T., Inc.
Self-Identification of a Handicap
1998 Summer Intern Program



Non-PACE Programs

Alabama A&M University
Future Assets Student Talent, Inc.

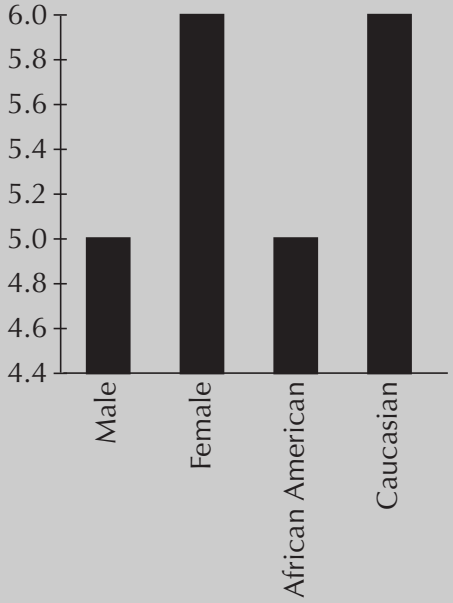
Formal fall recruitment began on September 2, 1998. A total of 18 new students have been recruited and enrolled in the F.A.S.T. program from seven Huntsville City high schools and middle schools. Recruitment in Decatur City, Limestone, and Morgan County began September 9 and continued throughout 1998.

1998 Summer Internships

Letters and applications for the summer 1998 internships were mailed in March 1998 with a deadline of April 30, 1998. Applications were sent to 21 potential interns. Seventeen of these applications were returned for review. Of those applications that were not returned, the reasons given were that the students either had secured employment for the summer or that the students would be attending summer school. The Alabama Department of Employment Services, in cooperation with the JTPA program in North Alabama, provided funding for six positions, while F.A.S.T. provided funding for five internships. Out of the 17 applications that were returned and considered, the 11 positions were filled according to their qualifications, personal interviews, and required paperwork and referrals. Alabama A & M University and Marshall Space Flight Center provided the facilities for the summer internships. The Army ROTC at Alabama A & M University served as a work site. The following departments at the Marshall Space Flight Center served as work sites:

1. Equal Employment Opportunity Office
2. Systems Analysis and Integration Laboratory
3. Microgravity
4. Human Resources
5. Structures and Dynamics Laboratory
6. Mission Operations Laboratory
7. Materials and Processes Laboratory
8. Safety and Quality Assurance

F.A.S.T., Inc.
Cumulative Demographics
1998 Summer Intern Program



Non-PACE Programs

Job Descriptions

Students were assigned to various duties and departments throughout the Marshall Space Flight Center organization. Four of those job descriptions follow:

- **Human Factors Technical Assistant**—Organize and obtain human factors engineering (HFE) materials, develop a data base for journals, books, and articles pertaining to HFE, research information that will support the engineers in the Human Engineering and Analysis Team (HEAT), and acquire knowledge of HFE to produce a final report during the final week of intern ship. The job required knowledge in the following areas: various Microsoft applications and Netscape or other Web browsers.
- **Configuration Management Assistant**—Support technical meetings, prepare presentation materials, update and maintain computer reports, reproduce documentation files, and attend staff meetings and project meetings.
- **Microgravity Research Assistant**—Assist the summer college intern with office tasks. Develop a file system for microgravity technical journal articles under the direction of the summer college intern. Develop PowerPoint presentation charts for each Microgravity Research mission. Cross-reference Marshall media relations' press releases with press releases posted on the Microgravity Research Program Office (MRPO) Web page; arrange for posting of additional press releases. Select Johnson Space Center, Glenn Research Center, and Jet Propulsion Laboratory (JPL) microgravity press releases for posting to the MRPO Web page. Develop HTML pages for the summer college intern for posting to the MRPO Web site. File and photocopy as required. Pick up microgravity research technical journal articles from RSIC as required.
- **Systems Analysis and Integration Laboratory Assistant**—Set up files and place procurement requests in chronological order. Pick up branch mail and distribute to various employees and departments. Use the Marshall taxi system to deliver correspondence to team offices and laboratory offices. Organize time and attendance records along with using the computer, copy machine, and fax machine. Perform inventory of test instrumentation and input the instrumentation identification numbers into the computer data base. Tour the Environmental Test Facility and the Space Station Environmental Control and Life Support Systems test areas while recording test data from in-process testing.

Alabama A&M University
Future Assets Student Talent, Inc.

Bowie State University
Bowie State University Satellite Operations and Control Center (BSOCC)

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Grant No.: NCC-5-201

Overview

Bowie State University acquired the Satellite Operations and Control Center (BSOCC) as a result of a partnership with the Goddard Space Flight Center that started in 1996. A support contractor was selected and the first students chosen. After the facility was readied, equipment and related software systems were installed and tested. In October 1997, 1 year ahead of schedule, the BSOCC began providing complete independent support of the SAMPEX (Solar, Anomalous, and Magnetospheric Particle Explorer) spacecraft, a small scientific satellite, that is part of the Small Explorer Program of Goddard. The project objectives are to (1) ensure the health and safety of the spacecraft, (2) develop students' competency and expertise in mission operation and control, (3) develop the educational infrastructure and programs in space technology, and (4) build partnerships among academia, Government, and industry. The BSOCC functions as a live laboratory in which the students take a real role in the daily communication and commanding of an active satellite, collecting science data from the four instruments on board.

Enrollment Data

The program provides training of six students at a time through two levels of spacecraft controllers. They receive the same training that is provided to new, fully employed professional controllers at Goddard, while pursuing a full academic workload through the academic year. The initial selection was for three students for the first level—that is, Command Controller. When they were certified after a year in training and ready to pursue certification at the next level—that is, Spacecraft Analyst—three other students were selected. To date, six students have been certified as Command Controllers, and three have been fully certified as Spacecraft Analysts.

The students come from their academic pursuits in the Computer Science, Computer Technology, and the dual Mathematics-Engineering programs. The dual Mathematics-Engineering program is one that allows students to complete their math requirements in 2 years at Bowie State and complete their engineering requirements in 3 years at one of three universities in the region: George Washington University, University of Maryland at College Park, and Morgan State University.

Non-PACE Programs

Bowie State University
Bowie State University Satellite Operations and Control Center (BSOCC)

Two of the three students who have completed the program by being certified at both the Command Controller the Spacecraft Analyst levels are seniors, and the other is a graduate student. Two of the three who are now certified at the Command Controller level are sophomores, and the other is a junior. The three new students are all sophomores.

Outcomes

To become fully certified, students undergo a rigorous training program that extends over 2 academic years. They spend 15 hours per week training—that is, reading manuals that describe the various subsystems aboard the spacecraft and undergoing group lectures, one-on-one lectures, and board sessions. They observe the professional spacecraft controllers, and, when deemed sufficiently prepared, perform, under close supervision, as controllers themselves. The material is grouped in logical units of manageable size, and the students are tested as they progress through each subset. When they have completed the set and demonstrated satisfactory performance in practice, they take a written test, and upon attaining a score of 90 percent or above, they are certified as either a Command Controller or a Spacecraft Analyst.

Command Controller certification allows students to configure the ground system, initiate the setup of the NASA ground network, perform prepass operations with the NASA ground stations, and perform postpass processing of spacecraft telemetry data. Spacecraft Analyst certification allows students to interpret and analyze telemetry data and perform spacecraft anomaly investigation. To become proficient in responding to anomalies, students will gain an indepth technical knowledge of the SAMPEX spacecraft, including the attitude control, power, thermal, communication, and command and data handling subsystems.

Partnerships

The BSOCC came into being as a result of a partnership between the Goddard Space Flight Center and Bowie State University. Goddard provided the hardware and the resident software systems necessary to the operational control of the SAMPEX spacecraft. This consisted of the workstations, personal computers, the Command Management System terminal and software system, the Transportable Project Operations Control Center hardware and software system, and the postprocessor software system. Goddard also established the T1 data transmission line and the communications links between Goddard and the BSOCC.

Non-PACE Programs

Bowie State University
Bowie State University Satellite Operations and Control Center (BSOCC)

In addition, this 2-year grant is being used to cover costs associated with the operation of the facility, stipends for the student controllers undergoing training, and a partial underwriting of the cost of the professional spacecraft controllers. The professional staff is responsible primarily for the student training and the health and safety of SAMPEX. Bowie State provided and prepared the facility in which the equipment was installed and the related infrastructure items, such as personal computers, E-mail, furniture, and telephones. Bowie State also provided financial support in the amount of $100,000 per year to make up the greater proportion of the cost of one of the professional spacecraft controllers and to provide additional funds for student assistantships.

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Capitol College
Precollege Minority Engineering Program

Overview

The Capitol College Precollege Minority Engineering Program (PREP) has been designed to prepare and motivate minority high school graduates for the rigors demanded by undergraduate studies leading to degrees in the engineering profession. The program upgrades the skills of minority students who have shown an interest in pursuing a bachelor of science degree in electrical engineering, computer engineering, or software engineering majors. This is done through a comprehensive effort to upgrade academic skills, study skills, and interpersonal skills. The goal is to lay the foundation for the successful completion of the rigorous curriculum leading to a bachelor of science degree in engineering.

Enrollment Data

Since 1992, NASA has funded PREP, which is held at the Capitol College campus in Laurel, Maryland. From 1992 to 1996, 10 minority students who had just graduated from high school and wanted to pursue academic degrees in electrical engineering completed the program. During the summer of 1997, this number was decreased to nine students because of a reduction in the overall program budget. In 1998, the budget was increased to accommodate 10 students again. Sixty-nine students have graduated from PREP. Of these, 32 are now enrolled at Capitol College in one of the engineering programs at the bachelor of science level or have completed their engineering degree requirements at the college.

Accomplishments

The PREP class of 1998 consisted of 10 students: seven men and three women. Eight students came from the metropolitan Maryland area, one from New York City, and one from Philadelphia, Pennsylvania. All hope to obtain engineering degrees at Capitol College or at another accredited engineering college.

Upon the conclusion of PREP, the results were outstanding. Nine of the ten students were enrolled at Capitol College in the fall. All nine students were enrolled in the electrical engineering program and have excellent prospects of graduating with a bachelor of science degree. The tenth student planned to take courses at Marymount University.

Non-PACE Programs

Capitol College
Precollege Minority Engineering Program

This was the most homogeneous PREP class yet in terms of academic ability and goals. They were very serious and academically oriented and devoted all of their spare time to their studies. It was an extremely mature group. Like the PREP class of 1997, they wrote and designed a wonderful magazine that discusses their impressions of the program and what it meant to them. They have expressed how beneficial they believe the program has been. It has given them a head start on the transition to college, helped them understand their academic/personal strengths and weaknesses, and increased their confidence in their ability to start their academic program.

Every summer, student feedback and program evaluations have shown that the students felt they were better prepared to enter college as a result of the 6 weeks they spent at Capitol College. In addition, comparisons of placement tests (pretests) in English and math with final tests have clearly shown improvement has been the norm for all students. Detailed evaluations of the results of each PREP class have been sent to NASA at the conclusion of each session and at the end of each academic semester.

Student Achievements

Since the summer of 1995, several PREP graduates have worked onsite as summer interns at NASA's Goddard Space Flight Center. This has been very successful in providing students with the opportunity to work with NASA engineers to obtain experience within their career field and get additional focus on the work of electrical engineering majors.

During the 1997–98 academic year, 22 of the then 59 PREP graduates were enrolled in engineering programs at Capitol College. In May 1997, a major program milestone occurred when the first member of the PREP class of 1992 received his bachelor of science degree. He is now working onsite at Goddard as a contractor employed by Hughes STX. In addition, three PREP students received associate in applied science degrees at the May 1997 commencement ceremonies; all three are continuing on for bachelor of science degrees. Two more PREP students received their bachelor of science degrees in May 1998; one is working as a contractor for the Department of Veterans Affairs, and the other is an electronics technician at the U.S. Naval Academy. Three or four PREP students are expected to graduate in May 1999.

The NASA Goddard Precollege Engineering Program (PREP) at Capitol College.

One PREP student worked onsite at Goddard as an intern during the summer of 1998. She interned in the Flight Electronics Branch. This position required her to utilize troubleshooting tactics for a compression interface, in which computer simulation of the design determined the source of problems through the output of the simulation.

Non-PACE Programs

Longitudinal Study

A recently completed annual update on the longitudinal progress of the PREP classes of 1992–97 continues to demonstrate the positive impact of the program. This longitudinal study includes an analysis of retention rates, cumulative grade point averages, and completed credits comparing entering freshmen minority students with PREP students. The benefits of PREP for students were clear:

- The average number of credits completed by the PREP students was higher than the average number of credits completed by their peers.
- The average cumulative grade point average of the PREP students was higher than the average cumulative average of their peers.
- The retention rates for the PREP students were higher than the retention rates of their peers.
- Two members of the incoming class of 1992 earned bachelor of science degrees. One of the two was a PREP student. In addition, 25 percent of the PREP class of 1993 have completed their bachelor degrees, compared to 5 percent of their peers.
- All three members of the incoming class of 1993 who earned associate of applied science degrees were PREP students, along with one student from the PREP class of 1994.

Partnerships

Scholarships for PREP students have been donated from Litton Industries and the Baltimore-Washington Corridor Chamber of Commerce Foundation annually for the past 4 years. The 1997–98 Litton Scholar is now working at Litton Industries as an engineering aide.

Capitol College
Precollege Minority Engineering Program

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The College of Santa Fe's Mobile Science Project at Jemez Pueblo: learning how to use microscopes.

The Mobile Science Project at Santa Ana Pueblo.

College of Santa Fe Mobile Science Project

Overview

Founded in 1996, by Dr. Bobbie Coleman, the Mobile Science Project provides educational outreach to rural Native American K–12 students, as well as to their teachers and parents, focusing on the bolstering of math, science, and technology education and curricula. The target population is more than 4,000 K–12 students at 19 Pueblo communities in north central New Mexico. The project has delivered highly interactive, nonformal workshops during the school year, summer day camps, and a live-in summer camp at the College of Santa Fe to more than 2,000 students and hundreds of teachers and parents in the target population since 1996. The project's main goals are to:

1. Pique interest and introduce science and math-based learning in the form of informal, hands-on activities to Pueblo K–12 students in rural areas who have limited access to science curricula, science museums, and related activities available in metropolitan areas
2. Teach that life is science, that learning science should be "fun and less prohibitive," and that science, math, and technology education complement—and do not contrast with—traditional Native American cultural mores
3. Provide Native American students with the "quantifiable" skills and tools necessary to enter and succeed in college and graduate school programs, majoring in math and/or the sciences

Perceived Need for Improvement

Although the number of Native American students entering college is increasing, the first-year dropout rate is staggering. This is primarily because of the inability of Pueblo-bound Native American students to acclimate into the college mainstream, as well as their not being prepared for college-level math and science courses.

How the Project Addresses the Need

Under the overall supervision and coordination of the College of Santa Fe's Department of Education (Dr. Barbara Reider, chair), the Mobile Science Project conducts intensive math and science education workshops. These workshops vary in duration from an afternoon to a week and are offered at elementary, middle, and high schools under grants from the Bureau of Indian Affairs and

Non-PACE Programs

public schools with predominantly Native American enrollments. Each workshop features a short verbal introduction from Dr. Coleman, along with discussions from teachers and students, followed by "fun" hands-on activities. These activities require the participation of all students and end with an intensive wrap-up session during which students are encouraged to recognize the interconnectedness of the concepts presented in science and math to their everyday lives. Prior to or during workshops, teachers are provided with didactic materials as well as instructions/ suggestions for incorporating the materials into their math and science curricula.

Why Mobile Science Is Unique

The Mobile Science Project is the only program in the United States that travels to remote Pueblo schools. This program begins the process of building science and math skills at the kindergarten level and continues working with students, teachers, and parents, increasing student skills through the senior year in high school. The program also combines the experience of the College of Santa Fe's nationally recognized Department of Education (the first in the nation to offer master's degrees in education focused on the unique needs of at-risk children in the public school setting) with Dr. Coleman's abilities to inspire children to want to learn science and math.

Outcomes

The main outcomes have been as follows:

1. Increased self-confidence and self-esteem when students realize that they can do complex science and math activities with ease
2. Increased public speaking abilities
3. Increased interest and mastery of advanced science and math concepts, leading to better grades in school
4. An increase in the number of students taking higher levels of science and math precollege courses
5. An increase in elementary schools using the term "precollege" when referring to their students
6. An increase in more sophisticated science fair projects, with students winning 18 place awards at State and national levels and traveling to India to participate in worldwide science competitions in November 1998
7. Increased parental involvement in the scientific education of their children
8. Increased mainstreaming of students with live-in science camps at the College of Santa Fe
9. A major increase in students wanting to enter college as science majors

College of Santa Fe, Mobile Science Project

The College of Santa Fe's Mobile Science Project at Jemez Pueblo: learning how to use microscopes.

The Mobile Science Project at Santo Domingo Pueblo.

The Chemistry Project at Nambe Pueblo results in making slime and rubber balls that bounce.

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Fayetteville State University
Teaching Integrated Mathematics/Science with Technology (TIM/ST)

Overview

The NASA-sponsored Teaching Integrated Mathematics/Science with Technology (TIM/ST) project at Fayetteville State University through the Mathematics/Science Education Center has provided training to 50 teachers of grades 4 through 8. Those who teach in grades 4 and 5 have self-contained classes, and those who teach in grades 6 through 8 have middle school teams. Five school systems are involved: Bladen, Cumberland, Ft. Bragg, Hoke, and Robeson Counties. All of the schools, except Ft. Bragg and one elementary school, have predominately minority enrollments, poverty levels requiring free and reduced lunches, and low performances on State and national evaluations.

Outcomes

The teachers have been involved in an intense 2-week summer workshop and one fall follow-up session. A second follow-up session is scheduled for March 1998. The training has focused on the North Carolina technology competencies, as well as strategies on how to incorporate technology in classroom instruction.

Participating schools and teachers have received technology that, with the training, will enhance instruction not only in mathematics and science, but also across the curriculum. Each teacher received a laptop computer, CU See Me, Quick Cam color camera, and a TVATOR. Each school received a digital camera, scanner, videocassette recorder, and camcorder.

Teachers and their students have been tremendously impacted by the equipment and skills acquired through this project. The following are activities generated by teachers and implemented in their respective classrooms/schools:

- PowerPoint presentations for open house at the beginning of the school year
- Mini-workshops on how to use PowerPoint 4.0 for teachers and parents
- Introduction of students to the Internet and World Wide Web
- Demonstration of TIM/ST skills (PowerPoint presentation) to the associate superintendent, Board of Education members, PTA, and so on
- Cooperation with teachers and students, such as cutting, pasting, and applying graphics and formatting diskettes

Non-PACE Programs

Fayetteville State University
Teaching Integrated Mathematics/Science with Technology (TIM/ST)

This project has also influenced a school system to bring more technology into the classroom. At West Hoke Middle School, for all their sixth graders, 30 laptop computers per teaching block will be purchased and set up on the net work server within the school. A TIM/ST teacher will serve as lead instructor and will be partially responsible for helping teachers develop and plan strategies for incorporating technology across the curriculum. TIM/ST has had a powerful effect on teaching and learning for the teachers and students during this first year.

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Florida Memorial College Minority Aviation Career Awareness Program (MACAP)

Introduction

The problem addressed by the Minority Aviation Career Awareness Project (MACAP) at Florida Memorial College is the underrepresentation of African Americans and other minorities in the aviation and space industry. The purpose of the project, therefore, is to recruit and provide sound educational opportunities and exposure to aviation and space exploration careers. The specific goals and objectives to be accomplished by the continuation project are to.

1. Provide career awareness of the aviation and space industries to African American and other minority high school students
2. Demonstrate how mathematics, physics, and computer science are related to the aviation and space industries
3. Enhance the skills of the above-mentioned minorities in the disciplines of physics, computer science, and mathematics

More specifically, the continuation phase of MACAP seeks to:

1. Recruit 20 high school minority students
2. Develop a curriculum of mathematics, physics, and computer science for these students with an orientation to aviation and space science
3. Provide these students with "hands-on" laboratory experiences in the indicated academic disciplines
4. Encourage these students to select or remain on a college track in high school
5. Inspire these students to pursue college majors in physics, computer science, mathematics, aviation, and space science
6. Expose these students to successful science and technology mentors

Project Accomplishments

The students were introduced to careers in the aviation and space industries. A field trip to NASA's Kennedy Space Center opened new career areas for these students. During the tour, the students saw engineers, technicians, and computer programmers at work and a film of astronauts. They also saw career exhibits on astrophysics, exobiology, and astronomy.

Non-PACE Programs

Florida Memorial College
Minority Aviation Career Awareness Program
(MACAP)

The students participated in several projects that involved math, physics, and computer science. In physics, they discussed fiction and nonfiction and used air tracts to determine velocities and acceleration under different conditions. The experiments involved the use of computers to collect data and control the various devices used. In the mathematics segment, the students concentrated on shapes and used computers to generate various shapes of objects. Emphasis was placed on programming and design.

The students gained valuable skills in math, computer science, and physics. They learned how to use PowerPoint software for presentations, set up presentations, and insert data and pictures into reports. They learned how to search and download information from the Internet. The students measured gravity using a pendulum, studied and measured velocity and acceleration, used lasers, and performed measurements using lasers. They designed computer games, studied symmetry, and programmed computers to generate various shapes, such as snowflakes and forests.

Twenty high school minority students from inner city high schools were recruited into the program. The curriculum the students followed was related to the aviation and the space industries. Some of the projects involved calculations and simulation. The students obtained flight training using computer trajectory simulation and Cessna 152 airplanes.

The students received considerable hands-on experience setting up experiments in physics using various instruments (such as lasers and air track pendulums) and computers. They designed computer programs using mathematics and algorithms. They assembled computers from components and loaded software onto them.

Several of the program participants were 12th grade students who went on to college. In fact, some left the program early to begin summer school at various colleges. They were replaced immediately by other students. The remaining students have expressed a strong desire to go to college.

Although some of the recruits in the program were not science majors, several have taken a strong interest in incorporating science into their careers. Many of the students indicated that they would like to work in the science industry for agencies such as NASA. The students formed a close bond with the program's faculty and in a few cases have mentioned emulating some of their instructors.

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Dr. Kleanthis Psarris, associate professor of computer science, and Gracy Calleros, NASA scholar and computer science major, work on a research project.

At the University of Texas at San Antonio, Dr. Clinton Jeffery, assistant professor of computer science, and Jermaine Williams, NASA scholar and computer science major, discuss the broader implications of the Internet.

Hispanic Association of Colleges and Universities
Proyecto Access

Overview

Proyecto Access is a program coordinated by the Hispanic Association of Colleges and Universities in cooperation with the Principal Investigator, Dr. Manuel Berriozábal of the University of Texas at San Antonio, and the eight Hispanic-Serving Institutions (HSI) hosting the summer program. Proyecto Access identifies economically disadvantaged students with the potential to become scientists or engineers and provides them with academic reinforcement in the pursuit of these fields. During the summer of 1998, the 8-week program was conducted on the following college campuses:

- Richard J. Daley College, Chicago, Illinois
- Florida International University, Miami, Florida
- Los Angeles City College, Los Angeles, California
- New Mexico State University, Las Cruces, New Mexico
- Pima Community College, Tucson, Arizona
- Jersey City State College, Jersey City, New Jersey
- Hostos Community College, Bronx, New York
- Community College of Denver, Denver, Colorado

This program is designed to increase the number of competently prepared middle school students who will ultimately pursue science and engineering studies in college and to acquaint these students with professional opportunities in science and engineering. The students selected participate in intensive work and study that reinforces their precollege studies through the development of abstract reasoning skills and problem-solving skills, logic, mathematics, computer science, and engineering. Other aspects will include field trips to local high-technology industries and agencies, lectures and speakers on engineering and science opportunities, and practice SAT/ACT examinations.

Proyecto Access programs are modeled after the Texas Prefreshman Engineering Program (TexPREP). TexPREP was started in 1979 at the University of Texas at San Antonio and now operates on 20 Texas community and senior college campuses in 11 Texas cities. The high school graduation rate of TexPREP participants is 99.9 percent, the college entrance rate is 92 percent, and the college graduation rate 87 percent. Of the college graduates, 56 percent are engineering or science majors.

Non-PACE Programs

Enrollment Data

A total of 696 students enrolled in the 1998 Proyecto Access summer program, 462 in PREP I, and 234 in PREP II (see charts).

Outcomes

Of those starting the program, 561 completed the program, an 80-percent completion rate. The 561 students completing the programs represent a 62-percent increase over last year's 349 students. Fifty-five percent of the students were Hispanic, 14 percent were African American, and 1 percent were Native American, which amounts to a total of 70 percent underrepresented minority participation. Well over one-half of the students were in the seventh and eighth grades (see tables and graphs).

Prep I (initial year) students complete courses in logic, problem solving, engineering/computer science, Internet technologies, and research or practical project building activities. Prep II (second year) students complete courses in algebraic structures, problem solving, physics, Internet technologies, and research or practical project building activities.

Complementary activities include field trips, presentations, and lectures by practitioners in engineering and science, as well as laboratory activities incorporating the application of science and physics concepts, such as designing a race car, fundamentals of rocketry, building a mousetrap car, a "Brain Bowl" competition, an electric circuits lab, a geometric structures competition, a physics lab, building a sailboat, and designing, building, and launching rockets.

Partnerships

All eight of the HSI's provided in-kind support in various forms: monetary, free lunches, use of their libraries and athletic facilities, technical support, facilities, staff, and faculty. Local school districts provided a wide variety of support, including equipment such as graphing calculators, transportation for students, free lunches for students, and teachers to teach or assist in teaching courses. City government agencies or entities provided support such as summer youth employment opportunities for the students, transportation, free lunches, and monetary support. Other partners included NASA's Kennedy Space Center (free admission for field trips), White Sands Missile Range (field trip), NASA's Test Facility in New Mexico (field trip), Hollman Air Force Base (field trip), Chino Mines (field trip), the Institute of Electrical and Electronic Engineers (prizes and awards to students), and local banks, businesses, and foundations (monetary support, prizes, and in-kind support).

Hispanic Association of Colleges and Universities Proyecto Access

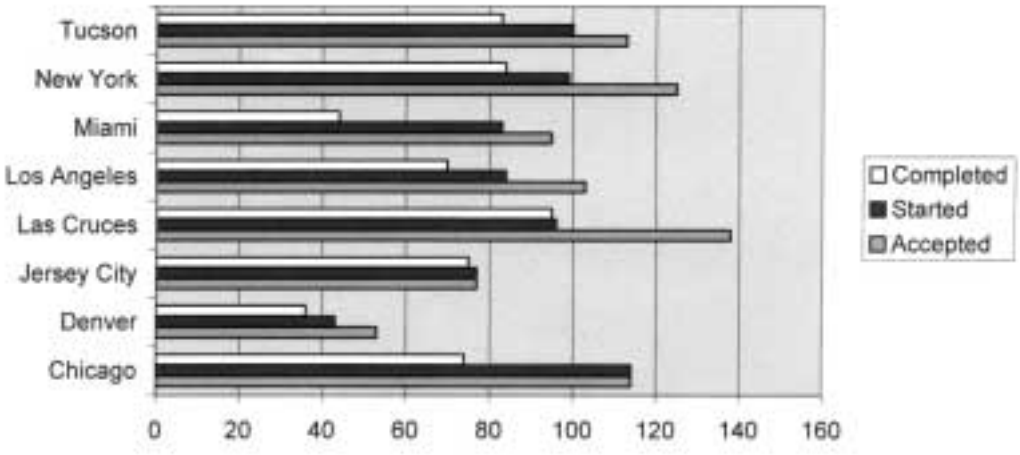
Dr. Cheryl B. Schrader, associate professor of electrical engineering, and Jason Polendo, NASA scholar and electrical engineering major, work on developing a new active electrode for measuring electrical muscle activity. This project is operated through the Coding, Communication, and Control Research Laboratory at the University of Texas at San Antonio. Research results are directly applicable to muscle atrophy caused by an antigravity environment.

Dr. Mita Desai, associate professor of electrical engineering, and Shalot Armstrong, NASA scholar and electrical engineering major, are doing research on the monitoring of disease vectors and vegetation classification along the Lower Rio Grande and at Kennedy Space Center.

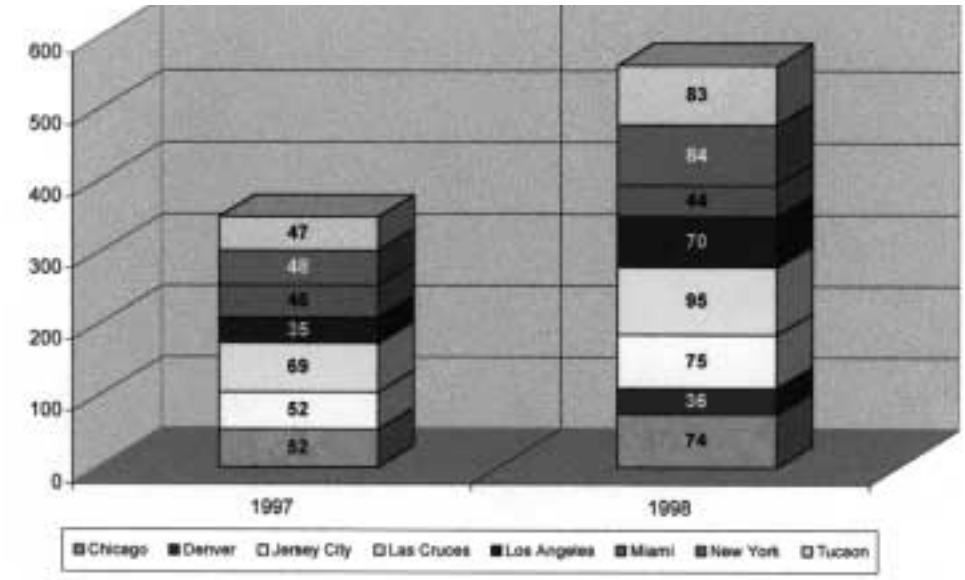
Non-PACE Programs

Hispanic Association of Colleges and Universities
Proyecto Access

1998 Proyecto Access
Retention



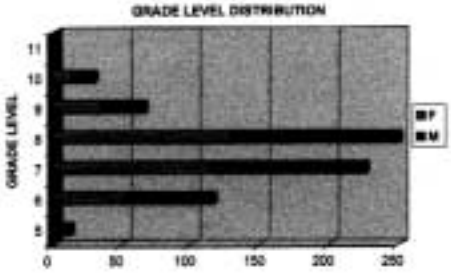
1998 Proyecto Access
Growth Rate

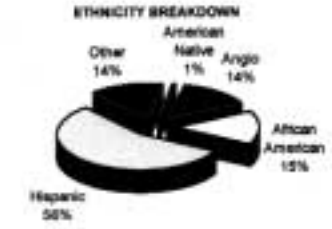


Non-PACE Programs

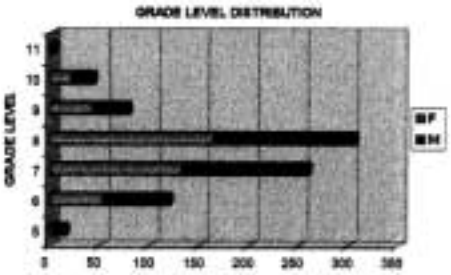
Hispanic Association of Colleges and Universities
Proyecto Access

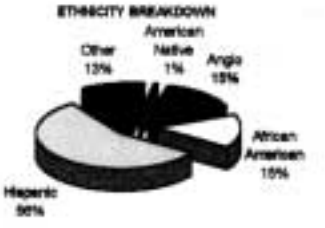
1998 Proyecto Access
Ethnic, Grade, and Gender Distribution
Total Started



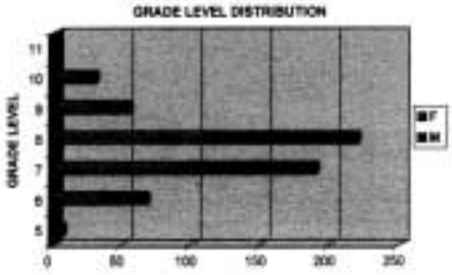


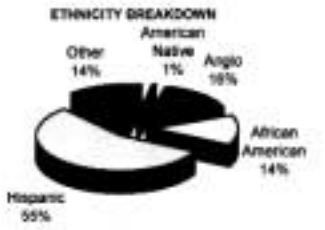
1998 Proyecto Access
Ethnic, Grade, and Gender Distribution
Students Accepted





1998 Proyecto Access
Ethnic, Grade, and Gender Distribution
Total Completed





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Midtown Educational Foundation

Overview

The Midtown Educational Foundation (MEF) has supported the education and character development of thousands of Chicago's inner city children for the past 33 years. MEF's mission is to offer programs that strengthen academics, improve personal behavior, and develop in students a spirit of service to others. MEF employs an integrated approach that links achievement and character development. This focus on both the personal and intellectual maturing of the child distinguishes MEF from other enrichment programs.

MEF offers three primary programs:

- The Walgreen's one-on-one program for fourth through sixth grade students
- The Metro/Midtown Achievement Program (MAP) for junior high students
- The College Orientation Program (COP) for high school students

Character development is the most unique and crucial component of MEP programs because it equips students with the habits and attitudes necessary for long-term success. Each student has an individual mentor, who helps the student integrate these values into their everyday lives.

Parental involvement is instrumental to the success of students. Recognizing that parents are the primary educators of their children, program volunteers work in tandem with parents. Our centers offer Parents' Night seminars, workshops, and a lecture series to help parents more effectively raise their children amidst challenging conditions.

Enrollment Data

MEF targets minorities from disadvantaged, high-risk neighborhoods. Students come from 100 public and private Chicago schools. In the 1997–98 school year, 223 girls and 264 boys enrolled in MEF programs. This summer, 227 girls and 292 boys are participating in activities. (The total is 364 fourth through sixth graders, 422 seventh and eighth graders, and 220 high school students.)

Non-PACE Programs

Midtown Educational Foundation

Outcomes

Within a suffering school system, MEP students are succeeding. While half of all Chicago public high school students drop out, 100 percent of MEF seniors graduate, and this year, that same number continued to college. Two satellite one-on-one programs enrolled 16 boys, surpassing the goal to serve 10 to 15 boys. The Home Technology Tutoring Project has placed computers in the homes of 15 boys and received donations of 60 more computers. This summer, 77 girls participated in the Metro Reading Initiative put in place to increase their reading levels and improve their comprehension skills. The Summer Business Course placed 30 girls and four boys in corporate internships, while 15 girls and 30 boys were acting junior counselors at the centers.

Last summer, MEP began a comprehensive evaluation of all of its programs. Tom Pavkov, a Purdue University professor on staff at the Chapin Hall Center for Children at the University of Chicago, led the study. During the 7-week summer program, students exhibited gains in language expression and mechanics equivalent to 4 months of growth, and mathematics scores soared more than one grade level. Students also reported increased moral awareness and positive character attitudes. This evaluation will help further identify program components that need to be improved, as well as the successful elements that need to be enhanced.

Partnerships

Walgreen Co. funds much of the one-on-one program. The Museum of Science and Industry works with the MAP students through special activities. Richard J. Daley College and Robert Morris College lend technical and financial support to the COP.

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Mount Holyoke College SummerMath 1998

Overview

SummerMath at Mount Holyoke College has developed innovative approaches to mathematics education for young women over the past 17 years. Teaching is based on constructivist pedagogy and research on females' learning of mathematics. Problem solving is used in all classes to develop higher order thinking skills. SummerMath has been covered nationally by ABC's *World News Tonight,* CNN's Newsroom, and *USA Today.* Nearly 200 high school girls have attended the program at no cost as NASA scholars.

Program Structure

Three 90-minute classes 5 days per week are offered: "Fundamental Mathematical Concepts," "Computer Programming," and 2-week "Science Workshops" on "Astronomy," "Biology of Growth and Genetics," "Brain Imaging," "Medical Ethics," and "Architecture and Mathematics."

Classroom Strategies

Teachers serve as facilitators, seldom giving answers to problems. Students interact mainly in pairs and small groups, explaining solutions in detail.

Recreation, Residential Life, and Other Activities

Daily athletic choices such as volleyball, tennis, and many other sports, plus weekly creative writing and improvisational theatre workshops. were offered in 1998. Informal college and career panels of professional women, such as computer scientists, emergency room physicians, lawyers, and undergraduates discussed their preparation for college while in high school, what their jobs are like, and what it is like to balance their personal and professional lives.

Non-PACE Programs

Mount Holyoke College
SummerMath 1998

Goals for Students

The goals are as follows:

- Increased confidence, flexibility, and persistence in problem solving and learning
- Perception of the utility of mathematics, awareness of career possibilities in mathematics-related fields, and awareness that mathematics is for all people
- Increased skill in communicating and reasoning mathematically

1998 NASA Scholar Information

In 1998, 24 students entered SummerMath, and all of them completed the program. The breakdown by was as follows: 3 eighth graders, 8 ninth graders, 4 10th graders, 7 11th graders, and 2 12th graders.

Overall Program Rating by NASA Scholars

On a 5-point rating scale:

- Sixty-five percent of the NASA scholars rated their experiences in the highest category.
- Ninety-five percent of the NASA scholars rated their experiences in one of the two highest categories.
- None of the NASA scholars rated her experiences in either of the lowest two categories.

Confidence Ratings by NASA Scholars

On a 9-point rating scale:

- Mathematics confidence: Average, beginning program = 6.4
  Average, end of program = 7.9

- Computing confidence: Average, beginning program = 5.9
  Average, end of program = 8.4

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New Mexico Highlands University American Indian Science & Technology Education Consortium (AISTEC)

Overview

The mission of the American Indian Science & Technology Education Consortium (AISTEC) is to develop and nurture Native Indian students for careers in science, engineering, and mathematics, with a focus on the primary role of the tribal colleges. Founded in 1993 with NASA guidance and support, AISTEC is NASA's premier tribal college serving consortium for science, engineering, and math (SEM) development. Through its connection with NASA programs and research centers, AISTEC is invigorating Native American interest and involvement in SEM.

The consortium consists of the following institutions: Arizona State University, Diné College, D-Q University, Haskell Indian Nations University, New Mexico Highlands University, Oklahoma State University, Salish Kootenai College, South Dakota School of Mines and Technology, the University of New Mexico, and the University of Washington.

In fiscal year 1999, AISTEC continues to pursue its three primary goals:

1. To assist AISTEC tribal colleges to develop curricular and technological infrastructure
2. To develop SEM articulation agreements between and among AISTEC tribal colleges, 4-year AISTEC universities, and their affiliated tribal colleges
3. To develop and implement transition and SEM skills development programs at precollege, 2-year, and university levels

In addition to these project goals, and within the framework of Executive Order 13021, AISTEC has added management goals:

4. To strengthen the role of and emphasis on tribal colleges
5. To disseminate and replicate models successfully developed within individual AISTEC institutions

Non-PACE Programs

New Mexico Highlands University
American Indian Science & Technology Education Consortium (AISTEC)

In fiscal year 1998, AISTEC helped support tribal colleges in many ways:

- It helped expand tribal college SEM degree and course offerings.
- It further developed the infrastructure necessary to support distance education.
- It developed technology transfer projects involving tribal colleges and agencies.

In fiscal year 1999, AISTEC will move toward greater tribal involvement within AISTEC and toward further development of alternative sources of income to support the expansion of AISTEC activities.

Outcomes

Goal 1: To assist AISTEC tribal colleges to develop curricular and technological infrastructure

Objectives:

1. To develop and offer six new SEM core courses among tribal college partners
   Target: 10-percent increase in SEM degree offerings
   Outcome: 25-percent increases in SEM degree offerings

2. To develop and pilot three SEM distance learning courses for tribal colleges
   Target: Develop and pilot three SEM distance learning courses for tribal colleges
   Outcome: Developed and piloted five SEM distance learning courses for tribal colleges

3. To develop and implement six new core SEM courses offered by AISTEC tribal colleges
   Target: 10-percent increase in SEM courses
   Outcome: 3.7-percent increases in SEM courses

4. To increase the number of American Indian instructional faculty teaching SEM at tribal colleges
   Target: Increase American Indian faculty teaching at tribal colleges
   Objective: Two American Indian faculty members added by AISTEC in FY 1998

Non-PACE Programs

New Mexico Highlands University
American Indian Science & Technology Education Consortium (AISTEC)

Goal 2: To develop SEM articulation agreements between and among AISTEC tribal colleges, 4-year AISTEC universities. and their affiliated tribal colleges

Objectives:

1. To establish a prototype SEM core curriculum based on national accreditation standards
   Target: To establish a prototype SEM core curriculum based on national accreditation standards
   Outcome: Prototype SEM cores curriculum, based on national accreditation standards, developed by SDSM&T and OLC

2. To complete three signed SEM articulation agreements between and among AISTEC tribal colleges, 4-year AISTEC universities, and their affiliated tribal colleges
   Target: Three signed agreements
   Outcome: One signed agreement, two near completion

Goal 3: To develop and implement transition and SEM skills development programs at precollege, 2-year, and university levels

Objectives:

1. To provide precollege SEM skills development to 300 students so that 50 percent test at or above current grade levels
   Target: 300 students—50 percent test at or above grade level
   Outcome: 235 students—62 percent tested at or above grade level

2. To provide precollege SEM interest building/skills development summer bridge programs for 100 American Indian students so that 75 percent show gain on posttest measures
   Target: 100 students—75 percent show gain in posttesting
   Outcome: 339 students—92 percent showed gain in posttesting

3. To provide SEM tutoring and mentoring services at AISTEC tribal colleges and affiliated tribal colleges to 150 American Indian students so that 50 percent complete SEM courses in which they are enrolled with a grade of "B" or better
   Target: 150 students—50 percent complete SEM courses with a grade of "B" or better
   Outcome: 274 students—68 percent (187 students) completed SEM courses with a grade of "B" or better

4. To provide SEM tutoring and mentoring services at AISTEC universities for 300 American Indian students so that 50 percent complete SEM courses in which they are enrolled with a grade of "B" or better
   Target: 300 students—50 percent complete SEM courses with a grade of "B" or better
   Outcome: 314 students—71 percent (223 students) completed SEM courses with a grade of "B" or better

5. To provide college entry and financial aid information and guidance to 250 American Indian students, of whom 75 percent will enroll in a college SEM degree program by fall 1998
   Target: 250 students (75 percent) of enrollees will enroll in SEM
   Outcome: 679 students (66 percent) of enrollees enrolled in SEM

Partnerships

New Mexico Highlands University has successfully piloted a model of technology transfer–based development, which has benefited a partnership between and among the university, the Assinboine and Sioux Tribal Industries, NASA's Johnson Space Center, and the AISTEC project. Similarly, the University of Washington has established a structure for resource enhancement through a partnership between AISTEC tribal colleges and Microsoft. AISTEC proposes to disseminate these models and provide technical assistance to all interested tribal colleges to replicate these development models. AISTEC management will conduct outreach through AISTEC and other tribal college organizations to publicize these projects, develop and implement workshops for interested tribal colleges, and provide technical advice and assistance to tribal colleges seeking to replicate the model.

New Mexico Highlands University
American Indian Science & Technology Education Consortium (AISTEC)

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New Mexico Mathematics, Engineering, Science Achievement, Inc. (NM MESA, Inc.)

Overview

New Mexico Mathematics, Engineering, Science Achievement, Inc. (NM MESA, Inc.), provides tutoring, role models and mentors, counseling, field trips, incentive awards, and summer enrichment programs to students in grades 6 through 12. NM MESA also provides inservice training of teachers, parents, and volunteers, publication and distribution of handbooks and other materials, and evaluation activities to ensure program effectiveness. The mission of NM MESA is to increase the number of students from underrepresented groups that graduate from high school prepared to pursue college majors in math, science, and engineering-related fields. MESA students, through the NASA Buddies Project, mentor elementary school students in math/science activities. The NASA Senior Incentive Field Trip rewards outstanding high school seniors with a trip to Kennedy Space Center, which provides them the opportunity to shadow a NASA engineer for a day.

Outcomes

NM MESA celebrated its 15-year anniversary in 1998. During this time, the number of middle and high schools has increased from 5 to 74, and the number of students impacted annually has risen from 125 to 3,400. Scores by NM MESA students on the ACT averaged 23.4, compared to 21 nationally and 20.1 for the State of New Mexico. Seniors graduating in May 1998 received about $74,400 in NM MESA-funded incentive awards. Of NM MESA females, 13.1 percent were enrolled in either precalculus or calculus. Of all MESA seniors in 1998, 34 percent took calculus and 53 percent took physics. Data collected annually from students has indicated that 98 to 99 percent of NM MESA students enroll in college. Alumni surveys done by NM MESA and by institutions of higher education indicate that NM MESA students are retained in college at a higher rate than non-MESA students are.

Non-PACE Programs

Partnerships

NM MESA works closely with ongoing minority engineering programs throughout New Mexico and with national organizations concerned with increasing the pool of underrepresented minority engineers. Two University of New Mexico projects, NASA training and PACE, provide mentors, as well as hands-on science activities, for NM MESA students and teachers. The New Mexico State Legislature, in recognition of this effective work with students, provides approximately 60 percent of NM MESA's annual operating budget. NM MESA works collaboratively with community groups, State and Federal agencies, national laboratories, and business. Each of these partners provides mentors, as well as financial and in-kind support.

New New Mexico Mathematics, Engineering, Science Achievement, Inc. (NM MESA, Inc.)

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Norfolk State University
Science and Math for Everyone Project

Overview

The Science and Math for Everyone Project is a research/education intervention strategy made possible by a close partnership among Norfolk State University, Norfolk Public Schools, and the Office of Education at NASA's Langley Research Center. This project seeks to develop unique strategies that enhance minority, female, and economically disadvantaged or disabled students' academic achievements in science and math. The long-term goal is for these identified students to take an interest in math and the sciences by selecting higher level math courses in high school in preparation for majoring in the sciences and engineering in college.

The Science and Math for Everyone Project is a developmental, quasi-experimental research design in which social work and educational interventions are provided by interns from the social work and education departments of Norfolk State University onsite at Lake Taylor and Northside Middle Schools. The twofold social work objective is to:

1. Identify and ameliorate socioeconomic, cultural, and environmental factors that might negatively impact student performance using a generalist social work perspective based on strength, diversity, and an ecological multisystem approach
2. Strengthen student self-esteem and self-confidence toward academic success

The educational objectives are to:

1. Assist student participants in strengthening their interest and academic performance in science and math during the seventh and eighth grade years
2. Expose student participants to a variety of field experiences to augment their academic learning

Accomplishments

The findings of this research are consistent with the earlier literature and research, which suggest that children respond best to and retain information better through hands-on experiences. Toward this end, the interns in the bachelor of social work degree program offered individual counseling and facilitated group sessions to promote motivation, self-esteem, and assertiveness and to improve on communications skills, the use of conflict resolution, and interpersonal relationships. Education program interns

Norfolk State University
Science and Math for Everyone Project

provided special assistance with homework and facilitated activities using the computer and direct involvement in the creation of science projects, which were on display at the school science fair. All of these activities were designed to promote and encourage higher interest and achievement in science and math. The interns in the master of social work degree program worked exclusively with families of the participants, assessing those factors in the students' home environments that may impede academic performance, and they designed intervention strategies to empower parents in accessing resources to enhance their children's achievement.

Relevance to the NASA Strategic Enterprises

Field trips to the Virginia Air and Space Center, the Richmond Science Museum, and the physics and chemistry laboratories at Norfolk State University proved to be inspirational, as demonstrated in the students' research and creativity of their science projects, which were displayed at the school science fairs. This particular phase of the project is in keeping with the mandate established by NASA's Space Science Enterprise Strategic Plan—to make use of knowledge and discoveries to enhance science, math, and technology education. For all but two of the students in attendance on the field trips, this was their first visit to the two museums, and the visits to the labs were a first for all of the students. They used their newfound knowledge and discoveries to create projects that they felt good about and put on display with pride. For them, it was not about having the best project; rather, it was about creating something special to them and having the necessary materials to complete the project.

Benefits to Society

The Science and Math for Everyone Project is a first step in preparing minorities, females, and the disadvantaged to participate in an arena that has been dominated mainly by white males. Corporate America has identified this population as a significant factor in the challenge to enhance U.S. economic competitiveness abroad. Exposure to a variety of science- and math-related activities and hands-on experiences will assist these students in making informed choices so that they are able to take the required courses, such as algebra through to calculus, in high school that will enable them to consider college as a possibility. Before exposure to the Science and Math for Everyone Project, college may not have been a consideration. Taking higher level math courses will enable these students to major in the science and engineering programs in college and be prepared to make a successful transition into the labor market.

Non-PACE Programs

Norfolk State University
Science and Math for Everyone Project

The goals of this program are stepping stones in helping produce an untapped workforce and turning the students into viable and productive citizens to meet the challenge of a highly competitive technological economy. A program of this nature will assist in guiding minorities, females, and the disadvantaged to make choices that will keep them in school and lessen the proportion of unproductive and dependent citizens on the taxpayer.

Student Achievements

There was no statistically significant difference between the two experimental groups and the control group in academic achievement. Participants in the two experimental groups, however, who were exposed to certain math skills such as integers, did evidence differences. These students felt more confident and understood the practice drills better than those students in the class who had not been exposed, as reported by their algebra teacher. In the area of science, teachers reported that they observed an eagerness to learn and participate voluntarily by those students in the program. A Recognition Ceremony was held at the end of the school year acknowledging three students for first place science projects, and four students were cited for outstanding attendance.

Norfolk State University
Rural Outreach Project

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Overview

The Rural Outreach Project is a partnership among the Office of Education at NASA's Langley Research Center, Norfolk State University, and the Cooperative Hampton Roads Organization for Minorities in Engineering (CHROME). The project's intent is to:

- Investigate the most effective strategies for expanding an innovative, NASA-sponsored precollege program into rural areas
- Field-test identified rural intervention strategies
- Implement expanded NASA educational programs to include 300 rural students who are disabled, female, and/or minority Outcomes

The project did not get started until January 1998 with the hiring of a Western Tidewater Regional Resource Manager (Rural Outreach Manager). On February 6, 1998, a presentation was made about the Rural Outreach Project at the QEM/MSE Network Conference in Washington, D.C. Two weeks later, an office was established in the Franklin Public School System. A new partnership was therefore established, and the Franklin School System donated office space and office furniture at Franklin High School to set up a local base of operations. Four CHROME Clubs were started in the school systems of Franklin and Southampton Counties, one in each of the high schools and one in each of the middle schools. Nine teachers from these schools participated in a Sponsor Training Day at the Virginia Air and Space Museum and became official CHROME sponsors. Student recruitment began in April, and by the end of the school year, a total of 140 students had enrolled in CHROME.

Southampton High School enrolled 32 students, Franklin High School enrolled 28 students, 20 sixth and seventh graders joined CHROME at S.P. Morton Middle School, and 60 students signed up at Southampton Middle School. Because student recruitment occurred so close to the end of the school year, the total number of students who joined CHROME was lower than the target of 300 students. Starting the 1998–99 school year with student recruitment and several CHROME activities, and with heightened efforts to publicize the Rural Outreach Project in the Western Tidewater community, the project should approach our target of 300 students.

Because of Norfolk State University's Rural Outreach Project, Larry Blunt participates in a demonstration during the Forces of Flight seminar at the National Air and Space Museum in Washington, D.C.

Non-PACE Programs

Norfolk State University
Rural Outreach Project

The major event at this point of the project has been the completion of a 2-week summer residential program, "Human Physiology in Space," held at Norfolk State University from June 22 to July 2, 1998. Twenty-one ninth through 12th graders from Franklin High and Southampton High successfully completed this educational program. Students spent many hours in class and working on individual and group research projects and several educational field trips (see photos). Some comments provided by the participating students included: "this was the best class and teacher I have had in a long time" and "I want to come back next year because it was fun and I learned at the same time. . . . I also liked learning about different careers in science." As a followup to the Summer Program, the project is presently recruiting individuals for the Saturday Science Academies and Parent Workshops, which will be held at Paul D. Camp Community College. The students who participated in the Summer Program will be included in the Saturday Academy.

All the students got an opportunity to touch and hold the human brain and other internal organs at Eastern Virginia Medical School.

Partnerships

The project has been cultivating partnerships with several businesses and academic institutions in the Western Tidewater area. Union Camp, Hercules, and Southampton Memorial Hospital are anticipated to join as members to provide professional mentors, guest speakers, and tours of the facilities. They will also offer financial support, a crucial component to maintain the project when the grant expires.

Travis Evans demonstrates the effects of microgravity in space by altering the blood flow in his body.

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Our Lady of the Lake University
Earth and Beyond

Overview

The Earth and Beyond Partnership Grant Program is a collaborative project between Our Lady of the Lake University and San Antonio College. The goal of the program is to "develop a teaching and learning model for middle school space/geoscience." This goal is supported by seven objectives:

1. To enhance preservice education at San Antonio College (SAC) and Our Lady of the Lake University (OLLU) by developing a model space/geoscience course
2. To enhance inservice education at OLLU by revising selected graduate science and education courses to include innovative curricula that incorporates content, teaching methodologies, and assessment strategies
3. To enroll at least 45 preservice teachers in the undergraduate course and 28 inservice teachers in the education/science course
4. To assist inservice teachers to incorporate components of the model curricula into the science curricula at their home schools
5. To expand the role of the Scobee Planetarium at SAC as an informal science
6. To conduct at least two research studies at SAC and OLLU on the restructuring of preservice and inservice curricula associated with this project
7. To determine the impact of the model curricula on students' and teachers'levels of understanding and their attitude about space/geoscience

Enrollment Data

This grant program divides the 14 Group 1 participants for ease in funding and recordkeeping. SAC funds half, and OLLU funds the remaining half. Therefore, OLLU has seven inservice teachers of the following ethnic breakdown: three Hispanics, one Native Americans, and four Anglos. All of these teachers are employed in hard-to-staff schools.

Sixteen inservice teachers have been selected for the second group. The ethnic breakdown is three Hispanics, one African American, and four Anglos. Fifteen of these teachers are employed in hard-to-staff schools.

Non-PACE Programs

Our Lady of the Lake University
Earth and Beyond

Outcomes

Group 1 has completed two paired courses: Space/Geoscience and a Pedagogy course on assessment using space/geoscience as a model. Each course had a pretest and posttest. Teachers were assessed on their attitudes toward science with the Test of Science Related Attitudes (TOSRA). The data from these assessments, as well as the teacher's grade point averages, are:

- GEOL 4391G Space/Geoscience—
  Average pretest scores = 69
  Average posttest scores = 84

- EDUC 6346G Assessment for Science Teachers—
  Average pretest scores = 1.9
  Average posttest scores = 3

- TOSRA—
  Of 350 possible points, teachers ranged from 67 to 98 percent, with an average of 87 percent.

- Grade Point Averages—
  GEOL 4391G = 3.6 of 4.0
  EDUC 6346G = 3.8 of 4.0

Partnerships

OLLU works collaboratively with SAC on this grant program. SAC provides the Scobee Planetarium as both a classroom and an informal teaching program. OLLU staff provide training and consultation to SAC faculty in the development of preservice geology and astronomy courses.

South Dakota School of Mines and Technology
Scientific Knowledge for Indian Learning and Leadership (SKILL)

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Overview

The mission of the Scientific Knowledge for Indian Learning and Leadership (SKILL) program is to develop and support academic training, emphasizing mathematics, science, and engineering, to enable minority students (principally Native Americans) to enroll in and graduate from postsecondary institutions. The SKILL program is an effort by the South Dakota School of Mines and Technology to help this nation overcome an expected shortage of professionals in math and science fields.

Beginning with an elementary program in 1989, SKILL has reached more than 3,000 Native American students, fostering their interest in math and science, increasing their awareness of career opportunities, and enhancing their confidence in their abilities. SKILL continues to provide a wide range of programming for students, including research opportunities, tutorial assistance, classroom curricula, and academic summer programs. These students have come primarily from the Pine Ridge, Lower Brule, and Cheyenne River Reservations and from the poorest counties in the United States. For most of them, the SKILL program provides educational opportunities, particularly in algebra, geometry, and precollege math; many of these classes are not available through their home schools.

The summer NASA Honors Program offers a 4-week summer residential program for four cohorts of Native American students entering ninth, 10th, 11th and 12th grades. Fourth-year students complete a total of 589 hours of program instruction and show an overall increase in their grade point average. Accomplishments from these students have included 15 separate experiments flown on two Space Shuttle missions and numerous regional and national science fair awards.

Non-PACE Programs

South Dakota School of Mines and Technology
Scientific Knowledge for Indian Learning and Leadership (SKILL)

Outcomes

This year's summer program included 65 students who participated in a variety of subjects, as well as community and physical endeavors. Students worked on a self-paced math program based on the Ohio Math Project. A communications class, centered on improving their writing, grammar, and speaking skills, was also part of the curriculum, as well as a computers class in which students created their own Web pages (see *www.sdmt.edu/skill/skill.nasa98*). Science classes included physics, geology, astronomy, Earth systems science, and a research/science fair project. Also included was a Native American culture class in which students studied Native American history in the areas of math and science. Twelve students entering their fourth year of high school enrolled in college classes of mathematics. Several of the students took two or three classes over the summer, including Algebra I, II, and III, Trigonometry I and II, and Calculus II. Their grades were 19 "A"'s, 2 "B"'s, 2 "C"'s, 3 "I"'s, and 2 "NC"'s.

Previous years have shown a retention of at least 80 percent. Surveys given indicated a probable return for 1999 of at least that many.

Non-PACE Programs

Southeastern Consortium for Minorities in Engineering (SECME), Inc.

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Overview

Since 1975, the Southeastern Consortium for Minorities in Engineering (SECME) has recognized the need to provide exceptional preparation in mathematics and science for K–12 students. SECME's goal is to increase the pool of underrepresented minorities who are prepared to enter and complete postsecondary studies in mathematics, science, engineering, and technology (MSET). SECME is an inclusive organization that encourages precollege students of all ethnicity to participate. SECME's foundation is built on strategic partnerships among K–12 schools, school districts, universities, industries, and government agencies. Through these partnerships, dramatic gains are being made in training teachers and promoting mathematics and science enrichment at the precollege level. SECME is developing new initiatives to strengthen SECME programs throughout the school year. Implementations of these initiatives represent a continuum of the SECME Summer Institute.

The following project objectives are also based on SECME's 5-year strategic program/business plan:

1. Conduct the Summer Institute and Leadership Academy for school system leaders
2. Strengthen the SECME model in the State of Arkansas
3. Sponsor SECME regional workshops and teacher mini-grants
4. Develop strategies to institutionalize the SECME program
5. Develop training for the SECME technical portfolio

Enrollment Data

SECME has successfully sustained the collaboration of 38 universities, 65 industry/government agencies, 102 school systems, 774 K–12 schools, and 22,007 students in Alabama, Arkansas, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, the District of Columbia, Prince George's County, Maryland, Baton Rouge, Louisiana, Syracuse, New York, and Houston, Texas. Of the 22,007 students, 58 percent are females and 42 percent are males.

The 22nd Annual SECME Summer Institute hosted by the University of Miami in Coral Gables, Florida, June 21–July 2, 1998, trained 254 teachers and counselors (including six educators from the Phoenix, Arizona, area and two educators from Freeport, Grand Bahamas) and 61 superintendents, principals, and school system leaders during the Leadership Academy. More

Southeastern Consortium for Minorities in Engineering (SECME), Inc.

than 180 students and chaperons participated in the SECME National Student Design Competition Finals during the 12 days. In addition, SECME held its first Regional Summer Institute August 2–8, 1998, which was hosted by the University of Houston in Houston, Texas. This 7-day intensive educator training included a total of 44 educators, of which 40 hailed from the Houston Independent School District, two from Reno, Nevada, and two from Columbia, South Carolina.

Twenty regional workshops were held throughout the 1997–98 school year as a continuum to the 1997 SECME Summer Institute. These workshops provided more than 400 educators with program implementation support, MSET curriculum enhancements, and ongoing technical assistance.

Outcomes

In 1997, President Clinton presented SECME, Inc., with the Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring. SECME saw expanded growth with the addition of Syracuse City Schools in Syracuse, New York. The number of SECME K–12 schools grew from 685 during 1996–97 school year to 774 in 1997–98—a 13-percent increase. In 1998, 3,554 SECME seniors graduated, bringing the graduated senior total since 1980 to 56,707. The SECME senior survey results showed that 86 percent of the respondents plan to enroll in a 4-year college. Of that number, 48 percent indicated MSET majors, and 25 percent indicated business, education, or prelaw. SECME seniors had average SAT scores of 1,036, and SECME seniors planning to pursue MSET majors had an average SAT score of 1,060. SECME's 1998 senior class had four students selected as NACME Tech-Force PreEngineering Prizewinners. BellSouth awarded $10,000 in scholarships to SECME State scholars pursuing engineering majors.

In addition to the 1-year investment of $400,000 from NASA, SECME, Inc., has been awarded a $330,000 grant that represents a 1-year investment from the U.S. Department of Energy and a 3-year investment of $900,000 ($300,000 per year from 1998 to 2000) from the Exxon Education Foundation.

SECME's Executive Director, R. Guy Vickers, and Associate Director, Brenda J. Simmons, led a delegation of educators, engineers, and industry partners to South Africa to present the SECME model. The delegation met with South African secondary and postsecondary education and engineering leaders to explore how the SECME model can be used to facilitate the building of partnerships between primary and secondary schools with postsecondary schools, industries, and government agencies.

Non-PACE Programs

Southeastern Consortium for Minorities in Engineering (SECME), Inc.

Partnerships

The SECME model is predicated on sustainable, systemic partnerships. SECME has established strong partnerships with K–12 schools, school districts, universities, industries, and government agencies. SECME partners with school districts in the National Science Foundation's Directorate for Education and Human Resources, State Systemic Initiatives (SSI), Urban Systemic Initiatives (USI), and Comprehensive Partnerships for Mathematics and Science Achievement (CPMSA). SECME provides each of the following school district staff with professional development and curriculum enhancements in MSET for teachers:

- Miami-Dade County Public Schools, Florida (USI)
- Memphis Public School District, Tennessee (USI)
- Jackson Public School District, Mississippi (CPMSA)
- Hamilton County Public Schools, Tennessee (CPMSA)
- Jefferson County Public Schools, Kentucky (CPMSA)
- Prince George's County Public Schools, Maryland (CPMSA)
- Syracuse City Schools, New York (SSI)

In addition, school administrators and school district leaders are networked with university, industry, and government partners to leverage these partnerships to ensure technical talent for the new millennium.

SECME has developed a strong partnership with 38 engineering universities that provide academic preparation, motivation, teaching strategies, curriculum enhancements and enrichments, hands-on activities, and the Summer Institute. Industry and government partners provide financial support, leadership training, national scholarships, and employment opportunities.

Issues/Concerns

SECME, Inc., is a unique organization. In its efforts to accomplish its mission and increase the number of underrepresented students who are prepared to enter and complete studies in MSET, the focus and approach are through teacher training and development. Throughout its 22-year history, the SECME model has been implemented and refined. The model has also proven to be successful in that it can be replicated on a national basis. These efforts to institutionalize the SECME model have become a goal of all the partners to meet the need of an exceptionally technical workforce in the new millennium. SECME continues to raise the bar to bring quality improvements to preparing today's students to be tomorrow's leaders. Growth with quality will remain a challenge for SECME.

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Southern University of New Orleans NASA/SUNO Partnership for Excellence in Mathematics Education

This program is funded by a NASA Partnership Grant awarded in FY 1997. The first year of the NASA/Southern University of New Orleans (SUNO) Partnership for Excellence in Mathematics Education project, with Dr. Panagiota Heath, Prime Investigator, and with the invaluable cooperation, assistance, guidance, and support of the NASA representative, Nancy Sullivan, was completed successfully as anticipated.

One aspect of the project was to establish an electronic classroom for the Mathematics Department. The electronic classroom is equipped with 28 computers, comfortable desks, a projector and screen, a smart board, a server, a printer, and TI-82 calculators. This equipment will be used to provide a state-of-the-art instructional methodology and to create a dynamic and exciting learning environment. Dr. Heath and Dr. Hardy, both professors of mathematics, are planning to pilot college algebra, precalculus, and calculus classes using the electronic classroom during the 1999 spring semester. Experimental and control groups used in the above classes will provide the data for qualitative/quantitative research to assess the effectiveness of integrating technology in the mathematics classroom. The study will be submitted for publication.

The NASA/SUNO Partnership for Excellence in Mathematics Education project.

Another aspect of the NASA/SUNO project provided faculty development programs for the Mathematics Department and Science Department faculty. The workshops, organized by Dr. Heath, gave the faculty of the Mathematics Department the opportunity to be trained in using teaching methodologies recommended by the NCTM Standards and integrating technology into the mathematics classroom. The faculty was especially pleased with the workshop on using Microsoft PowerPoint to make class presentations conducted by Mr. Kent Christian.

Finally, the faculty of the Mathematics and Science Departments and several mathematics and science majors were given the opportunity to travel to professional meetings. The involvement of students in the project was, as anticipated, very effective; the project was able to increase the number of majors in mathematics and mathematics education. Furthermore, all of the students who were given the opportunity to travel were motivated to continue their graduate studies, which was a primary goal of the project.

Non-PACE Programs

The project is very grateful to Dr. Maury of Alabama A&M University for selecting one of SUNO's science majors, Quincy Wilson, to participate in the 1998 summer internship program in Huntsville, Alabama. Along with the learning experiences, these types of programs broaden the students' horizons toward graduate school. There is much talent at SUNO that needs to be discovered and given the opportunity to flourish. This project is pleased to report that it provided such opportunities to the students. The project expresses its gratitude to NASA for selecting SUNO to participate in the Partnership for Excellence in Mathematics Education, and the university looks forward to future endeavors.

Southern University of New Orleans
NASA/SUNO Partnership for Excellence in Mathematics Education

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Trenholm State Technical College High School Science Enrichment Program (HSSEP)

Overview

The NASA-sponsored High School Science Enrichment Program (HSSEP) is held at Trenholm State Technical College in Montgomery, Alabama. The program is geared toward minorities and females in grades 9 through 12 from Montgomery County and surrounding areas. The specific objectives of the program are to:

- Increase and sustain the enrollment of disadvantaged, underrepresented talented students in precollege MSET courses
- Reinforce students' math, science, and computer science skills
- Improve students' grade point averages in math and science
- Increase student retention in math and science
- Improve students' SAT/ACT performance
- Expose students to MSET careers, role models, and pathways to MSET careers

The overall goal of the NASA HSSEP is to produce a college-bound student with the necessary science, mathematical, computer science, and communications education to pursue a degree and career in the math and science arena.

These objectives are carried out through two components: two 10-week Saturday Academy sessions (fall and winter) held during the academic year and a 7-week Summer Science session. Each student in the NASA HSSEP has four core courses: mathematics applications, integrated science, computer science, and communications. In addition, the students take field trips to further explore the realm of science. In an effort to properly prepare the students for taking the ACT/SAT tests, the program also develops their analytical and critical reasoning skills, effective study skills, and good test-taking techniques.

Enrollment Data

Ninety-five students participated in the NASA HSSEP in the academic year of September 1997 to August 1998. These 63 females and 32 males ranged from grades 9 through 12. The majority, 71 percent, resides in the Montgomery County School District, with 29 percent from the Lowndes County School District.

Outcomes

There was a 100-percent high school graduation rate among HSSEP students. Eighty percent of the graduates enrolled in a college seeking a science degree. Gerald Cobb, a graduate, ranked fifth in his class and attended the 1998 Summer Bridge Program for entering college freshman at Alabama State University. Almeta Robinson graduated with an Advance Diploma; she was selected as one of the "Top Ten Academic Students" and was a member of the National Honor Society, the Mu Alpha Theta—Math Honor Society, and the Spanish National Society. Other accomplishments of the NASA HSSEP are:

- Continued significant increase in the number of students who were admitted as ninth graders
- Rate of participation by young males of 36.6 percent
- Retention rate of 96 percent within the 1997–98 sessions
- Attendance rate of 94 percent
- Highest mathematics posttest score in HSSEP history
- Increased median math/science grade point average of participants to a 3.00

The NASA HSSEP participants no longer avoid tough courses nor take only the required math and science courses. All participants enrolled in college preparatory math and science courses. Those students taking college preparatory math and science courses above their grade level have maintained a 3.12 mathematics grade point average and a 3.00 science grade point average. Twenty-one HSSEP students were accepted into gifted programs, magnet schools, or gifted classes. The previous concern of poor male performance in the classroom has been addressed, and the performance margin between male and female participants has decreased. The male classroom performance in the NASA HSSEP and in school has improved after being in the program for two or three sessions. The students have attributed this improved performance to the study skills and test-taking techniques developed through NASA HSSEP instruction.

HSSEP participants have said that the program met or exceeded their learning objectives. The students' level of confidence regarding taking college preparatory math and science courses has increased. In fact, grade reports show an improved classroom performance in math and science. HSSEP teachers have reported that other skills, such as the use of computers to solve math/science problems and improved communications (other than writing), are developed by both new and persisting students. The NASA HSSEP positively affects students' social interaction skills. The exposure to the college environment gives the students a sense of independence and responsibility. The junior and senior students see themselves now as role models for the younger participants. They are more helpful and supportive of each other.

Trenholm State Technical College
High School Science Enrichment Program (HSSEP)

HSSEP teachers administer the ACT pretest.

Juniors and seniors tour NASA's Kennedy Space Center in Florida.

Non-PACE Programs

Trenholm State Technical College
High School Science Enrichment Program (HSSEP)

As part of Trenholm State's High School Science Enrichment Program, a senior biology class studies the human body.

Students prepare a class project in the computer lab

Parents have indicated additional evidence of HSSEP's positive impact on participants. These indications include:

- There is improved study and homework behavior. Students are not waiting until the last minute to study and complete or correct homework.
- Computer use is now more research and less game oriented.
- Social networks now include peers with high academic expectations and the discipline needed to achieve those goals.

Activities are continually implemented to enforce parental involvement in the participant's academic pursuits. The computer literacy and mathematics refresher program for parents was well received. These parent refresher courses show, by example, the importance of continuing education and a need to improve and expand one's skill set.

During the summer 1998 session, the NASA HSSEP participants went on field trips to:

- U.S. Space and Rocket Center–ASTROTREK Adventure, Huntsville, Alabama
- Air Force National Guard, Montgomery, Alabama
- Tennessee Aquarium, Chattanooga, Tennessee
- NASA's Kennedy Space Center, Orlando, Florida
- NASA's Stennis Space Center in Mississippi

While on these trips, the students learned of the achievements science has brought to fruition and the exciting and boundless opportunities available in the math and science fields.

Partnerships

The HSSEP staff has developed relationships with guidance counselors, math and science teachers, and other school administrators in Montgomery Public Schools, Lowndes County schools, and other school systems. They provide resources for recruitment and the monitoring of student performance. The Educational Support Staff of the Montgomery Airport Traffic Control Tower provides a mini-internship program for HSSEP juniors and seniors to receive computer instruction and actual work experience in the area of air traffic control, basic aerodynamics, and tower operations. The neighboring Alabama State University provides use of its two buses for transporting students to various activities and field trips, as well as access and use of its science and computer science laboratories and equipment by HSSEP participants.

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University of Maryland
El Ingeniero

Overview

El Ingeniero seeks to instill an interest in mathematics, science, and engineering careers in Hispanic junior high students and to enhance their mathematics and science skills. The program consists of two components: the Summer Component and the Alumni Component. The Summer Component consists of three elements:

1. Self-Awareness Element
2. Career Exploration Element
3. Mathematics and Science Enrichment Element

The objectives of the Summer Component are to:

- Reinforce the students' self-confidence, self-esteem, and positive attitudes toward the world of work
- Provide the students with an overview to the engineering occupation and its career options
- Increase the students' skills in mathematics and science

The objectives of the Alumni Component are to:

- Reinforce alumni self-confidence, self-esteem, and positive attitudes toward school and work
- Maintain alumni group identity and a mutual support network dedicated to mathematics and science achievement
- Provide alumni with information regarding educational and career opportunities in mathematics, science, and engineering
- Motivate and increase the skills of the parents of alumni in working with their children's educational concerns.

The activities that have been used to accomplish these objectives include the presentation of the summer projects, alumni/parent meetings, career and guidance counseling, and summer job and internship placement assistance.

Parents are involved in all aspects of the program. Specifically, each student's parents:

- Participate in a program orientation before the start of their child's El Ingeniero experience
- Participate in a midprogram parent luncheon seminar (focusing on planning for future educational opportunities, including college)
- Accompany their child on field trips not only as chaperones but as active participants in the experience

University of Maryland
El Ingeniero

- Participate in a closing ceremony in which their child makes a final presentation and displays his or her projects
- Interview candidates for the program during the program recruitment process

Enrollment Data

The participants of the Summer Component were 19 (approximately 50 percent boys and 50 percent girls) seventh and eighth grade students, primarily Hispanic, from junior high schools in the Capital District Area (that is, Montgomery and Prince George's Counties, Maryland; Washington, D.C.; and Northern Virginia). The students are on or above grade level with a "B" average or above in mathematics or science. They are U.S. citizens currently enrolled in normal or honors college-prep mathematics and science sequences. The process for selecting the students includes contacting middle schools in the Capital District Area and, with their staff assistance, identifying students who meet the selection criteria. Students are selected on the basis of academic records, school recommendations, attendance reports, and the screening interview conducted by parents of El Ingeniero alumni. In addition, four high school students participated in the Summer Component. Two were interns working alongside the middle school students, and two older students were program assistants with staff responsibilities. The participants of the Alumni Component are the 346 alumni of the Summer Component.

Accomplishments/Student Achievements

Alumni have graduated from the country's finest engineering schools and are now professional engineers. The program has also been a bridge and catalyst for alumni to reach for other opportunities in the education pipeline. Herein lies the value and exponential impact of El Ingeniero.

Because of the breadth of media coverage (such as the National Geographic Society's World magazine) on the program, El Ingeniero's impact has been national and international in scope. This, coupled with the director's promotion of mathematics, science, and engineering education in collaborative efforts with public and private middle-schools in the Capital District Area, means that over the years, El Ingeniero has positively affected thousands of Hispanic and other students. During the 1998 Summer Component, the students developed and published individual Internet Web pages and constructed, under the guidance

of a civil engineer, a working model of a dam. Among the program's featured guest speakers was a civil engineer internationally known for his expertise in constructing tunnels. The program director also made a presentation focusing on leadership and the education needs of Hispanics to employees of the Arlington County government. The presentation was broadcast on cable television.

Partnerships

The program's summer host is the University of Maryland at College Park. Specifically, the university's Center for Minorities in Science and Engineering enables the project to obtain university support services (such as copying, buses, and parking permits). Other university departments (such as Physics, Engineering, and Agronomy) have provided the program with space. Private industry, government agencies, and other institutions have provided support through speakers and hosting field trips.

University of Maryland
El Ingeniero

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University of Puerto Rico at Mayagüez Partnership for Space Telecommunications Education

Overview

The Partnership for Space Telecommunications Education was first awarded in July 1, 1997. The principal partners in this project are NASA's Goddard Space Flight Center and the Electrical and Computer Engineering Department at the University of Puerto Rico at Mayagüez (UPRM). Goddard and UPRM will collaborate on a program for mentoring of students in radio frequency, microwaves, and space telecommunications design through the master's level. UPRM will install, using NASA funds from the NASA-URC Tropical Center for Earth and Space grant and additional monies from the University of Puerto Rico, a ground station for synthetic aperture radar satellites and for such high-data-rate platforms as Landsat 7. The Electrical and Computer Engineering Department and the Far Ultraviolet Spectroscopic Explorer (FUSE) at Johns Hopkins University will also partner in the installation and operation of a ground station for FUSE at a site within UPRM, and they will also promote educational and research opportunities.

Student Achievements

For two summers, beginning master's students from the Electrical and Computer Engineering Department at UPRM have been collaborating with Goddard personnel in the development of future Tracking and Data Relay Satellite System (TDRSS) communications systems. During the summer of 1998, Javier Díaz-Serrano worked on a TDRSS and Shuttle PN Code Generator, while Eliud Bonilla-Gonzalez designed a Channel Combiner for the International Space Station S-Band Single Access Port. Both Javier and Eliud received mentoring from David Israel. Nelson Rodriguez-Rosario worked on an S-Band Array Antenna 3-Bit Phase Shifter, and Kelvin Cabrera Cuevas developed an S-Band Phased Array Wilkinson Power Divider, both mentored by Ken Hersey. Eladio Rodriguez-Rivera worked on the implementation of the Cordic Algorithm on Field-Programmable Gate Arrays supervised by Richard Katz, and David Pérez simulated a Squaring Loop using MATLAB.

Non-PACE Programs

Student Outcomes

All the students that have joined the Partnership for Space Telecommunications Education are currently pursuing graduate degrees. A total of six master's degrees are expected to be awarded thanks to this NASA partnership. The mentoring organizations at Goddard have praised the student work and have expressed their wish that further actions be taken to further the collaboration between Goddard and UPRM.

University of Puerto Rico at Mayagüez
Partnership for Space Telecommunications Education

University of Texas at Brownsville and Texas Southmost College Hispanic Mother-Daughter Program (H.M.D.P.)

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Overview

The Hispanic Mother-Daughter Program at the University of Texas at Brownsville and Texas Southmost College focuses on encouraging the participation of Hispanic females in career fields such as math, science, engineering, and medicine through higher education.

Objectives

The program objectives are to:

- Provide exposure to role models in MSET careers, hands-on and laboratory field experience, and exposure to MSET and health professions
- Offer skill-building and enrichment programs that use individualized instruction plans and promote cooperative learning, activity-based instruction, and discovery methods
- Provide academic support that includes tutoring, study skills, and test preparation
- Work with the participants' mothers to provide support and encouragement for their daughters to succeed

Enrollment Data

The total number of students served since September 1, 1995, are 298. The program enrollment for the past 3 years has been: first year—64 students (1995–96); second year—94 students (1996–97); and current year—140 students (1997–98). The target grade level is eighth grade, and the 298 students were all female Hispanics.

Non-PACE Programs

University of Texas at Brownsville and Texas Southmost College
Hispanic Mother-Daughter Program (H.M.D.P.)

Program Implementation

Program Strategies

Through activities that promote self-sufficiency and self-respect, academic support services were designed to:

- Help with the completion of high school and college
- Break down cultural barriers to nontraditional careers—in particular, math, science, engineering, and medical careers
- Bring together both mothers and student participants in joint educational and career development projects

Recruitment Strategies

Recruitment strategies include presentations in math and science classrooms, utilization of on-campus sponsors, in-school announcements over the intercom, word-of-mouth (student to student), and the contact of parents over the telephone.

Selection Criteria

Participants must be Hispanic girls in the eighth grade who are first-generation college students, are from low-income families, and have great interest in mathematics and science.

Partners

The partners are the University of Texas at Brownsville and Texas Southmost College, Brownsville Independent School District, Los Fresnos School District, San Benito School District, and Point Isabel School District.

Tracking

Tracking is done by name, address, ethnicity, gender, Texas Assessment of Academic Skills (T.A.A.S.) scores, mailing surveys, and phone calling.

Courses Targeted

The courses are mathematics, pre-algebra, algebra I and II, pre-calculus, calculus, trigonometry, geometry, science, biology, anatomy, chemistry, and engineering.

University of Texas at Brownsville and Texas Southmost College
Hispanic Mother-Daughter Program (H.M.D.P.)

Outcomes

The results so far are as follows:

- Eighty-eight-percent program retention rate
- Expanded number of schools targeted, which increased from six to seven schools
- Increased number of targeted students in each school from 15 to 20
- Increased number of targeted students from 64 in 1996 to 140 in 1998
- Seventeen-percent increase in H.M.D.P. student T.A.A.S. scores in all areas compared to all targeted school districts
- Seventeen-and-a-half-percent increase in H.M.D.P. student T.A.A.S. scores in the areas of math and science

Lessons Learned

After 2 years, an opportunity was presented to improve the program by hiring three university student mentors. This facilitated the tutoring and self-enrichment sessions, the tracking of students' academic progress, and the presence of role models for the students in the program.

Non-PACE Programs

University of Texas at Brownsville South Texas Engineering Math and Science (STEMS) Program

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Overview

Students from south Texas traditionally have not been prepared for technological leaps occurring in education and job markets. Hispanic students face barriers that limit their access to careers in engineering, math, and science. The trend away from traditional jobs in factories and agriculture leads to an increasing risk that the Hispanic population in south Texas, already surviving on the economic mainstream, will be further marginalized. This South Texas Engineering Math and Science (STEMS) Program substantially improves the participation rate of students in south Texas entering science-oriented fields by exposure to what is available and what they can achieve.

Objectives

The objectives of the STEMS Program are to:

- Increase student interest and academic achievement in engineering, math, and science
- Provide an extensive network of role models in the careers of engineering, math, medicine, and science for students
- Expand career awareness of engineering, math, and science to elementary students
- Increase family awareness of college and careers in engineering, math, and science
- Increase student awareness of financial aid options and scholarship opportunities
- Form a cadre of former students to serve as role models
- Increase financial commitment from the university and school districts, and discuss dependence on grant money

Enrollment Data

The number of students involved in STEMS has increased from 184 in 1996 to 310 in 1997. This year, 344 students participated in the program. Of the 344, 326 were Hispanic, with 203 females and 123 males. Students of white ethnicity included nine females and nine males. All 117 seniors from STEMS graduated from high school. Eighty-four are now enrolled in college. This has increased from last year's 66 students.

Non-PACE Programs

University of Texas at Brownsville
South Texas Engineering Math and Science (STEMS) Program

Outcomes

STEMS sought to track down previous STEMS students. Over 6 years, 309 have entered college. 156 entered the University of Texas at Brownsville/Texas Southmost College, while 153 entered other colleges, such as MIT, Stanford, Duke, Notre Dame, Cornell, Texas A&M University, and the University of Texas System universities.

STEMS had an increase in number of students entering engineering competitions from 198 students in 1997 to 222 in 1998. One hundred and sixty students visited the University of Texas at Brownsville/Texas Southmost College campus during a science and engineering orientation organized by STEMS.

STEMS started in the Brownsville Independent School District and was incorporated as part of the regular curriculum using district funds. Most programs never reach this stage and indeed are dropped after grant funding dries up. The initial success at the school district prompted the move to five other school districts as families and the schools become aware of the opportunities STEMS has to offer.

Partnerships

NASA, Gorgas Science Foundation, the University of Texas at Brownsville/Texas Southmost College, and the school districts provided funds for field experiences, activities, and the summer program. School districts are expressing a tremendous interest in STEMS and are increasing funding for the program every year.

University of Texas at San Antonio Texas Prefreshman Engineering Program (TexPREP)

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Overview

TexPREP is an academically intense, mathematics-based summer project conducted at 23 colleges and universities in 13 cities throughout the State of Texas. The project identifies high achieving middle and high school students with the potential to become scientists or engineers, and it reinforces them in pursuit of these fields. Enrollment particularly targets students who are female and members of minority groups that traditionally have been underrepresented in these professions. Selection criteria include an overall "B" average or better, teacher recommendations, a completed application, and an essay.

TexPREP stresses the development of abstract reasoning and problem-solving skills, as well as the application of this knowledge, through coursework, team projects, class presentations, and examinations. The curriculum encompasses the following areas: mathematical logic, pre-algebra, algebra I, geometry, algebra II, trigonometry, precalculus, calculus, computer science, physics, overview to engineering, probability and statistics, technical writing, and career awareness. In addition, TexPREP provides career-oriented guest speakers, field trips, and mentoring by college instructors, high school teachers, military officers, and undergraduates majoring in engineering, mathematics, or science. The program is presented over the course of three summers, each session lasting approximately 8 weeks.

All participants are expected to maintain a 75 average or better performance standard during the program. Each student earns a final grade that is reported upon request to his or her school. The Texas Education Agency has given permission for individual school districts to approve TexPREP participation as an elective credit toward high school graduation. During the school year, many TexPREP students participate in academic cocurricular programs conducted by local chapters of the Texas Alliance for Minorities in Engineering.

TexPREP charges no tuition or fees. This enables students from diverse cultural and economic backgrounds to attend without any financial barriers. At most TexPREP locations, the local Texas Workforce Commission Summer Youth Employment and Training Program (SYETP) has designated the program as a work site. In this way, some participants who are economically disadvantaged can earn approximately $725 for their TexPREP experience. A free

Non-PACE Programs

University of Texas at San Antonio
Texas Prefreshman Engineering Program (TexPREP)

or reduced cost lunch is offered to those who qualify through the Texas Department of Human Services Summer Food Service Program. Where possible, assistance with transportation is provided.

The 1998 TexPREP staff included 155 instructors who are college faculty members, middle school and high school teachers, Air Force officers, and civilian engineers and scientists. The administrative and institutional support staff totaled nearly 100 individuals. In addition, 180 college undergraduates, most majoring in mathematics, engineering, or science, served as program assistant mentors. Seventy-six high school students, who were successful graduates of three summers of TexPREP, were funded through the Texas Workforce Commission (SYTEP) to serve as junior program assistant mentors.

Enrollment Data

In 1998, 2,870 students started the program, and 2,460 completed it. Of those who began TexPREP, 80.53 percent were members of minority groups traditionally underrepresented in the fields of mathematics, science, and engineering; 49.51 percent were female. The distribution by grade (completed) runs as follows:

Grade 5:	4	Grade 6:	370
Grade 7:	396	Grade 8:	742
Grade 9:	524	Grade 10:	283
Grade 11:	137	Grade 12:	4

Outcomes

Immediate Results

Through the experience of success in a rigorous academic program, participants learn that through perseverance and hard work, they can achieve. They successfully negotiate studies in a college environment. They gain experiential knowledge of college life and educational opportunities. They have exposure to a wide variety of careers in the fields of mathematics, science, and engineering. Plus, they learn that these careers are attainable, as well as the steps required to do so. They are better prepared for precollege courses in mathematics and science.

Tracking

Data collected includes name, address, ethnicity, gender, parent's educational level, grades, courses taken, career choice, college entrance, college major, highest academic level completed, and high school and college graduation information.

Non-PACE Programs

University of Texas at San Antonio
Texas Prefreshman Engineering Program (TexPREP)

Longitudinal Data

TexPREP's 1998 Annual Survey is currently being compiled. For the 1997 Annual Survey, 5,366 former participants were of college age. Of these, 3,204 responded (a 60-percent response rate). These returns indicated that:

- The high school graduation rate is 99.9 percent.
- Ninety-three percent are college students or college graduates.
- The college-attending rate is 62 percent.
- The college graduation rate is 31 percent.
- Fifty-four percent of the college graduates received science or engineering degrees.
- Seventy-five percent of the college graduates are from minority groups traditionally underrepresented in the fields of mathematics, science, or engineering.

Awards

TexPREP has been the recipient of a number of awards. In February 1998, the TexPREP Director received the Giants in Science Award from the Quality Education for Minorities Network and, in May, the Dream Weaver award from the San Antonio chapter of the I Have A Dream Foundation. In September 1998, the San Antonio TexPREP was designated a La Promesa de un Futuro Brilliante (the Promise of a Bright Future) Program by the National Latino Children's Institute.

Partnerships

Financial and in-kind support is received from numerous local, State, and national public and private sector agencies and industry. All colleges and universities where TexPREP is located work in close collaboration with local school districts, many of which provide in-kind instructional support.

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University of the District of Columbia Saturday Academy Program

Overview

The Saturday Academy is an "open enrollment" educational enrichment program that was established to increase the number of disadvantaged students interested in and prepared to pursue careers in math, science, engineering, and technology (MSET). Although the Saturday Academy began as a program for eighth and ninth graders recruited from the District of Columbia Public Schools, participants' low standardized test scores, high dropout rates, and other educational risk factors suggested the need for earlier intervention. In response, the Saturday Academy shifted its emphasis to focus primarily on fourth through sixth grade students from educationally underachieving districts throughout the D.C. area.

Students who attend the two 10-week Saturday sessions during the academic-year and the daily half-day sessions during the summer are exposed to a hands-on, discovery-oriented instructional approach that includes nonnumerical mathematical systems, computer applications and programming, and electrical engineering. Students who successfully complete the Saturday Academy are encouraged to continue their educational enrichment in the junior and senior high school programs that comprise the University of the District of Columbia's MSET pipeline. Thus, the Saturday Academy's short-term objectives are to:

- Increase the number of students who master core competencies in math, computing, and electrical engineering
- Develop a pool of students who enroll and succeed in junior and senior high MSET enrichment programs

The longer term objective is to produce a significant number of the District of Columbia Public Schools students whose test scores, grades, course enrollment, and leadership qualify them for admission to and financial support from 4-year colleges of engineering/science.

Non-PACE Programs

University of the District of Columbia
Saturday Academy Program

Enrollment Data

The 300 to 400 students enrolled at the Saturday Academy sites are primarily fourth through sixth graders. The Saturday Academy participant population reflects the racial and economic composition of the District of Columbia Public Schools from which students are recruited. Special efforts are made to attract and retain boys who tend to be underrepresented in educational enrichment programs such as the Saturday Academy. Another 300 to 350 students are supported by this grant; they are the seventh to ninth grade students in a Saturday Academy replication program operated at Fayetteville State University. Using University of the District of Columbia–trained faculty and a curriculum and instructional approaches similar to the Saturday Academy's, Fayetteville provides a context for assessing the program's transferability.

Outcomes

Despite serving a substantial number of educationally at-risk students in an urban district whose problems are legendary, Saturday Academy alumni are responsible for:

- Seventy-five percent of the National Achievement Scholarship finalists from D.C.'s preengineering high school (Dunbar)
- Eighty-three percent of all Dunbar valedictorians and salutatorians since 1986
- Ninety-one percent of all the District of Columbia Public Schools' preengineering graduates completing college course work prior to graduating from high school
- Nearly all of the identified District of Columbia Public Schools recipients of undergraduate and graduate MSET degrees from institutions such as Princeton, Stanford, Yale, and Cornell
- Leading systemwide student government organizations, as well as those within their schools
- The continuous supply of student assistants and professional staff whose unwavering commitment to the Saturday Academy allows the program to hold the line on costs

Non-PACE Programs

University of the District of Columbia Saturday Academy Program

The Fayetteville replication, which includes a number of students from rural areas, had:

- A high school completion rate of 100 percent for alumni, despite the program's "open admissions" policy
- The highest above-grade math/science course enrollment figures of any North Carolina precollege MSET enrichment program;
- The highest percentage of alumni choosing college math/science majors of any North Carolina precollege MSET enrichment program
- Significant improvement in students' classroom performance in MSET subjects

Partnerships

The major partners in this endeavor have been the District of Columbia Public Schools, which contributes facilities and services, the Cumberland County (North Carolina) Schools, and the U.S. Department of Education, which funds a program that serves as a "feeder" for the Saturday Academy. Parents and District of Columbia Public Schools' principals and counselors have been important collaborators and sources of positive publicity. Saturday Academy alumni have been an invaluable resource, in their capacity as mentors, role models, and instructional staff.

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Voorhees College
Voorhees College GIS Center

Overview

The primary goals of the Voorhees College GIS Center are to enrich the talent pool of minority students who would successfully pursue graduate study and careers in the geographical information system (GIS)—a NASA mission-related field—and to establish education and research infrastructure in GIS at Voorhees College. The five objectives in this project are to:

- Establish GIS at Voorhees College, which will provide education, training, and research facilities to all targeted audiences
- Develop educational programs in GIS at Voorhees College and stir interests in GIS among students and faculty members to attract more students pursuing GIS-related careers or advanced degrees in this area
- Promote awareness of GIS in the local public school systems, and increase the number of students, especially minority students, in the pipeline of getting into GIS-related careers
- Assist the city, county, State, and Federal agencies in developing GIS application packages to streamline their management, planning, and decisionmaking processes in areas such as transportation, taxation, health system, emergency system, and environmental control

Enrollment Data

The project targets the students majoring in mathematics, science, engineering, and technology. The total number affected by this project is 80 students, all of who are American African, since June 1, 1997. Sixty percent of the students are female, and 40 percent are male.

Outcomes

A minor degree program in GIS was developed and implemented in 1998. An introductory course in GIS was taught in the spring of 1998, and 12 students were enrolled. So far, 16 students have participated actively in the project. In the summer of 1997, two students were selected to participate in the Langley Research Center Cooperative Education Program in GIS-related areas. In the summer of 1998, four students worked at Autometric, Inc, in Virginia as interns for 10 weeks on various GIS applications at the production level. One computer science graduate got a job in the GIS area as a result of this project. The state-of-the-art GIS laboratories exposed students to UNIX and NT platforms for the first

Voorhees College
Voorhees College GIS Center

time in the entire history of the college. The project entered into an agreement with the Town of Denmark to develop a vector base map to be used to plan the town's public transportation system. The project entered into a tentative agreement with the County of Bamburg, South Carolina, to assist the county with the development of its tax assessment system using GIS technology.

Partnerships

The project has several partners representing government, academy, and industry: NASA's Langley Research Center, the Department of Geography at the University of South Carolina, Autometric, Inc, in Virginia, and ERDAS, Inc., in Georgia.

Lessons Learned

The enhancement of communication between partners is important to the success of the project. Training and skills in high-tech areas will dramatically increase chances for minority students to get into high-paid careers.

PACE Programs

Bennett College
PACE/SEMSET

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Overview

The PACE program at Bennett College is a 6-week summer residential camp and a 7-month Saturday Academy for middle and high school students. Specifically, the program targets Guilford County school students between the sixth and 11th grades. The project combines academic instruction with practical application and hands-on experiences to introduce new concepts and enhance the knowledge of its participants. The focus of the PACE/ SEMSET program is science and technology, with specific emphasis on biology, chemistry, computer science, and space technology.

The Life Skills portion of the program seeks to enhance the social aspect of the lives of the participants. This is achieved by counseling sessions that address social issues that have an impact on middle and high school children. Exercises in conflict resolution are designed to help youth address conflict appropriately.

Objectives

The overall objectives of the program are to:

- Motivate middle and high school students to pursue careers in science
- Heighten each student's awareness of the importance of science, mathematics, and computer science to daily living
- Build self-confidence and remove negative attitudes toward math and science
- Provide a broad range of instructional, extracurricular, and recreational activities designed to allow the participants to explore science and math

Improvements

The program experienced several improvements. Teachers who work in the Guilford County School System served as teachers of biology, English, computer science, and mathematics in the SEMSET Program. This proved to be a major advantage in that the instructors were familiar with academic issues that needed to be addressed. In addition, these instructors were familiar with the curriculum patterns and competencies that must be achieved by the students within the public school system. Most of the participants attend schools within the Guilford County School System. Another improvement was the addition of the Physics curriculum. Also, there were separate teachers for middle and high school mathematics and English classes.

The University Preparatory Program at California State University at Los Angeles.

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California State University at Los Angeles University Preparatory Program (UPP)

Overview

The University Preparatory Program (UPP) provides underrepresented, disadvantaged students at Garfield High School and Lincoln High School with a pathway to a baccalaureate degree in mathematics/science-based fields. In the fall, approximately 80 ninth grade students are accepted into UPP at each high school. These students have "C" to "B" grades and agree, with their parents, to participate in a program that requires a rigorous college preparatory curriculum, after-school tutoring, and Saturday laboratory experiences at California State University at Los Angeles (CSLA). The goal of the program is to prepare these students for success in college science, engineering, and mathematics majors. UPP was first established at Lincoln in 1989. The purpose of this PACE/MSET project is to determine whether UPP can be replicated at another high school and to further refine the Lincoln program. Thus in 1996, a UPP program was established at Garfield.

The University Preparatory Program at California State University at Los Angeles.

Enrollment Data

During the 1997–98 reporting period, there was a total of 364 students in the UPP programs at Lincoln and Garfield. These were all Hispanic students. At Lincoln, there were 78 in grade 9, 62 in grade 10, 55 in grade 11, and 46 in grade 12. At Garfield, there were 62 in grade 9 and 61 in grade 10. Students are recruited for UPP through close cooperation with the counselors at the feeder middle schools. An initial screening is done of all eighth grade middle school students who are potential UPP students. The project looks for middle achieving students who have grades in the "C" to "B" range and good attendance records. These students have the potential to earn a baccalaureate degree but, for several reasons, seldom do so. When available, scores on standardized tests are also examined. Candidates for UPP are then interviewed individually and told about the program. Written information is given to each candidate, along with an application to take home. Personnel make final decisions on admission from CSLA and the high schools.

PACE Programs

Outcomes to Date

A major objective of UPP is to determine whether experiences and successes with the initial program at Lincoln could be duplicated at other high schools. Starting a second program at Garfield provides a useful test of the validity of the general UPP program concept. Garfield is a multitrack school, which is on a different timetable than a traditional single-track school such as Lincoln. Garfield also changed principals at the start of the first year of UPP, while Lincoln has had the same principal since well before UPP started there in 1989. At both schools, administrative support for UPP is excellent.

In its second year, UPP at Garfield showed many indicators of the success that it has had at Lincoln. The retention rate for students is good. Of 64 ninth graders that started UPP in the fall of 1996, 62 were still in the program at the end of the 10th grade. Teachers are pleased with the progress of the students, citing commitment, excellent attendance, and persistence as qualities that mark their UPP classes. All the teachers at the end of the second year wanted to be assigned UPP classes. The students take integrated science and math courses in the ninth and 10th grades. These courses are in the development stage for Garfield. NASA materials have been used in the development of the integrated science courses. The peer-led study groups have proven to be successful as a tutoring model and are being continued into the third year. Parental involvement continues as they participate as partners in the development of UPP. Sixty-four students were selected to enter UPP as ninth graders in the fall of 1998.

The Lincoln UPP continued to build on a solid base in the second year of the PACE program. There were 238 students in grades 9 through 12. Fifteen teachers are teaching UPP classes. Many of the students have performed at a level that warrants enrollment in Advanced Placement courses. Generally, the UPP students are successful in those courses. Through a NASA partnership grant, 11 UPP students participated in research groups at the Jet Propulsion Laboratory for the summer of 1997 and another 11 for the summer of 1998. These students had an excellent experience that strengthened their resolve to prepare for math/science-based careers. At the end of the 1997 summer, three of these students were offered academic year, part-time positions by their group leaders, and similarly, three more were offered positions at the end of the 1998 summer. Seventy-five students were selected to enter UPP as ninth graders in the fall of 1998.

California State University at Los Angeles University Preparatory Program (UPP)

The University Preparatory Program at California State University at Los Angeles.

PACE Programs

California State University at Los Angeles
University Preparatory Program (UPP)

In the second year of the NASA PACE program, there were 123 UPP students enrolled at CSLA. These are students who completed UPP requirements at Lincoln and enrolled at the university. (Several others are attending other institutions of higher education). Of those at CSLA, approximately half declared majors in math/science-based fields upon entry to the university, 16 are working in research groups, and 10 recently completed their bachelor's degree requirements. In 2 more years, these numbers of student graduates and enrollment in colleges will increase as the Garfield UPP increases.

In the first year of the NASA PACE program, action plans were developed by Lincoln and CSLA English faculty to improve the reading and writing performance of UPP students. In the year just completed, these plans were implemented using NASA PACE funds, and additional resources made available by the California State University system. With the additional funds, the UPP tutoring program was expanded by providing tutors in selected UPP English classes to assist the teacher through one-on-one work with students. These additional funds were also used to expand the math tutoring program. The results will be assessed as these students move into higher grades and on to CSLA.

The project was able to run all of the planned UPP activities. These included three Saturday morning activities at CSLA for each science class at both high schools. They were mostly science labs, but they also included some lectures and demonstrations, as well as library and public speaking skill-building activities. During the year, there were three parent meetings at each school, a December potluck event at Garfield, and a midday December social activity at Lincoln. In addition, there were field trips for several of the individual classes. Among these were two oceanography trips aboard the California State University boat (Yellow Fin), attendance at a ballet (The Ballet Folklorico), and two trips to the Los Angeles Zoo. The year ended with separate award ceremonies for each high school.

The University Preparatory Program at California State University at Los Angeles.

The UPP program at Garfield has had a solid start. A third group of students has been successfully recruited, and so far it seems that UPP is a model that can be successfully replicated at other high schools. As expected, it has required a major increase in personnel to add another UPP high school. The structure that was proposed to handle this seems to be working well. In particular, three CSLA seniors who are UPP students from Lincoln were hired to work with the UPP director. Two of these students worked at the high schools and one in the UPP office at CSLA. It is particularly gratifying that they have all done an excellent job and are completing the loop by reaching back to mentor the younger UPP students.

PACE Programs

Student Achievements

In 1997, 364 students were in the UPP program. Of these, 41 graduated in the spring of 1998, and 303 were continuing in the UPP program at the two high schools in the fall of 1998. Of the 41 who graduated, 37 enrolled in a 4-year college, and 15 of these declared majors in science-, engineering-, and mathematics-based disciplines. Three enrolled in a community college, and one joined the military.

Partnerships

The partners are CSLA, Garfield and Lincoln High Schools, and Southern California Edison. CSLA coordinates the project and provides faculty, laboratory materials, financial aid and admissions counseling, and facilities for several events during the year. Garfield and Lincoln provide administrative support, faculty to teach UPP classes and supervise tutoring sessions, counseling support, and facilities for meetings and tutoring. Southern California Edison donated $1,200 for field trip expenses.

California State University at Los Angeles
University Preparatory Program (UPP)

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City University of New York (CUNY)–Lehman College University Preparatory Program

The proposed program provides students from Bronx high schools the opportunity to prepare for careers in science, mathematics, and technology. Participation is required in project-oriented, inquiry-based, hands- and minds-on science based on real-world issues related to Earth systems and physical science. The goal is to build a seamless science-mathematics pipeline for students that facilitates and eases the transition from secondary to postsecondary education, as well as to link high school teachers with college faculty and with Bronx Systemic Initiative member schools in planning and delivering science project-based learning and developing alternative assessment techniques. By engaging students in activities that afford them the opportunity to gather information on a topic, formulate hypotheses, design research using the concepts of variables and controls, gather data, analyze data, and explain findings through projects in science, mathematics, and technology, they use and hone techniques of critical thinking and problem solving and are captivated by participating in laboratory experiences of their own design in which outcomes may be predictable but are uncertain.

The areas of study include Earth systems, physical climate, and Internet/technology/research. Students engage in sequential constructivist/laboratory projects in the three areas during summer and academic-year project sessions. A highlight of the program is, as always, the Academic Olympics-a college bowl-type competition that is a weekly event during the summer in which cooperative teams of students compete to earn points. The point structure is such that any team can win up to the last competition by improving their preparation efforts, thus sustaining interest over the summer sessions.

Program evaluation relies on alternative assessment procedures, including student portfolios composed of lab journals and reports, library research papers, and selected school work; long-term tracking of program participants; anecdotal reports of program staff, coordinators, counselors, and group leaders; a comparison of general, science, and mathematics academic achievement with a matched sample; and a comparison of attendance in the program and in school, standardized test and regents scores, PSAT/SAT scores, the rate of progress toward graduation, college advance and type and status of college, and level of scholarship support.

Elizabeth City State University Precollege Awards for Excellence in Mathematics, Science, Engineering and Technology

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Overview

The major purpose of the project is to provide instructional enhancement in mathematics, science, computer science, and technology to 100 eighth-grade-level students of five middle schools located in rural, poverty-stricken northeastern North Carolina. This is accomplished through instructional activities via a Saturday Academy, a Summer Science Academy, After-School Club activities, and science- and technology-focused field trips. Faculty development, through a series of Saturday workshops conducted by invited consultants and active participation by parents in every programmatic phase, is the hallmark of this total endeavor.

Objectives

The objectives of the program include identifying students with a strong interest in mathematics, science, and technology and providing them with intellectually challenging experiences and activities to:

- Motivate them to develop a life-long interest in learning mathematics, science, and technology
- Enable them to develop personal goals leading to continuing their mathematics, science, and technology studies at high school and college
- Enable them to develop their self-confidence in their own power to successfully negotiate, understand, learn, use, explain, and profit from science and technology
- Explain how scientists, mathematicians, and technologists develop, promote, and create mathematics and science, thereby enriching their lives and the lives of their fellow humans

Another objective of the project is to increase student awareness of career options in mathematics, science, and computer and other technologies. This objective is achieved though exposing the students to professionals in the fields of mathematics, science, and technology either by arranged visitations at their workplaces or by inviting them to give lectures and/or demonstrations to program participants. Students were trained in accessing the Internet (in schools where this is available) and using it to procure a variety of information pertaining to activities in which NASA is

Elizabeth City State University Precollege Awards for Excellence in Mathematics, Science, Engineering and Technology

involved, such as understanding our changing planet. The students compared space food with regular food to study the impact of space food on our regular food. They exploited capabilities to develop science and math projects for participating in variety of competitions. They developed scale models of the solar system and a biodome. They assembled rockets and spaceships and used computer applications and research related to space travel.

Lessons Learned

With carefully structured academic activities involving hands-on experiences in a laboratory setting, students are very receptive to cooperative participation in problem solving and scientific experimentation. Science- and technology-focused field trips and guest lectures provide tremendous motivation to the students in learning science, mathematics, and technology. Frequent interaction with professionals in the field of mathematics, science, and technology is a strong booster for goal setting in mathematics-, science-, and technology-related professional careers. The principals of the school sites are critical factors in the success of such a project.

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Fayetteville State University NASA/MUREP-MSEN Precollege Program

Overview

The NASA/MUREP-MSEN Precollege Program concluded this academic year with participation of 375 sixth through 12th grade students. Through its implementation of the Summer Scholars and Saturday Academy components, students were exposed to instruction in mathematics (conceptual math through calculus), science (sixth grade science through physics, electrical engineering, robotics, and biotechnology), computer science, communications skills building, course counseling/career advisement, and research and methodology. The MSEN Precollege Program provided the services briefly described in the following sections.

Academic Enrichment Components

The Summer Scholars Program is a 4-week summer program held at Westover Middle School from June 30 to July 29, 1997. Approximately 300 students participated.

The Saturday Academy consisted of 10 sessions of Saturday classes held each semester. The special recognition ceremonies and parent fundraisers were as follows:

10/17–18/97	Leadership Retreat for senior high school students held at Camp Caraway in Asheboro
12/6/97	Holiday/Highlights Ceremony and Raffle Fundraiser
3/10/98	Expanding Your Horizons Conference for seventh grade girls at North Carolina State University, focusing on increasing the student's awareness and interest in pursuing science degrees
4/4/98	Cultural Day presented by middle school students, for which the students prepare dishes, skits, and musical selections representing different cultures
4/18/98	MSEN Day-98, which involved hosted competitions in math, science, and technology and had more than 700 parents, students, presenters, and volunteers present
4/25/98	Annual Fish Fry Fundraiser hosted by the Parent Support Group for MSEN Precollege
5/2/98	Annual Awards Program and Banquet, with more than 300 parents and students in attendance Tutorial Programs

Afternoon tutorial services in math and science were provided. These were open to the public, Monday through Thursday, from 4:30 until 6:30 p.m. Saturday tutorial services for MSEN

PACE Programs

Fayetteville State University
NASA/MUREP-MSEN Precollege Program

Precollege students in math and science were also provided. These were one-on-one tutorial services. Individualized services were provided to students needing help in specific math and science courses.

SAT Preparation Workshops

End-of-grade mathematics workshops were available for middle school students, and computer science workshops were held consecutively with the Saturday Academy sessions.

Summer Scholars Program–98

This 4-week program (100 contact hours) was held at Reid Ross Middle School, June 22 through July 20, 1998, Monday through Thursday, from 8:00 a.m. to 2:30 p.m.

Annual Field Trip

This field trip was to New York City on July 23–25, 1998.

Fort Belknap College
Preserving the Past and the Future

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Overview

This project, "Preserving the Past and the Future," is the product of close collaboration between Fort Belknap College and the Harlem School District. In its third year, the continued focus was to increase Native American student interest, participation, and success in math, science, engineering, and technology (MSET) fields.

Outcomes

With the collaboration of area agencies, accomplishments included:

- Sixty-four fifth and sixth grade students visited Fort Belknap College to dissect lab specimens and to tour KGVA, the local public radio station.
- Students participated in the Harlem School Science Fair, with five progressing to the regional science fair.
- Tutors were placed in schools to strengthen math, science, and technology areas.
- Thirty-six students attended a 4-day outdoor education camp at Beaver Creek on Fort Belknap Indian Reservation, with students planning menus and preparing meals.
- Outdoor camp presenters focused on science careers, especially for women.
- A generator was purchased for outdoor camp.
- Three area teachers attended geographical information system/global positioning system (GIS/GPS) training to bring GIS/GPS projects into the classroom.
- One hundred twenty-five students attended a math/science day with hands-on activities, which included map making, experiments, health promotion, and chemical reactions.
- The leases were paid off for the computers at Harlem school, which has a total enrollment of 520.
- One hundred ten teachers attended the inservice "Learning Enhancement Through Participation."
- Full Option Science System (FOSS) training was given for area teachers and implemented in classrooms.
- Fort Belknap College students visited with the area high school to discuss career options.
- Students participated in local Earth Day activities.
- The project worked with area schools to implement Arcview through the Montana Natural Resource Information System.
- Fort Belknap College purchased equipment (graphing calculators, M2V System I with 20-inch screen and remote and video pointer system) to be used by each project school.

PACE Programs

Fort Belknap College
Preserving the Past and the Future

Partnerships

Area agencies providing assistance with NASA projects included the following:

- Fort Belknap College faculty and students
- Harlem Elementary, Junior High, and Senior High Schools
- Dodson Schools
- Hays/Lodge Pole Junior and Senior High Schools
- Mission Elementary School
- Fort Belknap Talent Search
- Fort Belknap Vocational Rehabilitation Office
- Fort Belknap College Safefutures
- Fort Belknap College High Plains Rural Systemic Initiative
- Fort Belknap College School-to-Work
- Montana State Library
- Montana Fish, Wildlife and Parks
- Coca-Cola and Pepsi Companies
- Fort Belknap Children's Project
- Montana State University-Northern faculty
- KGVA staff
- Montana State Historical Society
- Fort Belknap Extension
- Bear Paw Battlefield
- Bowdoin National Wildlife Refuge
- Montana State University-Bozeman Extension
- Fort Belknap Tribal Health
- Montana Center on Disabilities

The NASA activities were strengthened as a result of collaboration with other community programs. Students participated with enthusiasm and have already requested lab dissection activities for this year. Fort Belknap College will continue to maintain partnerships established with area agencies over the past 3 years that assist the community with "Preserving the Past and the Future."

Hampton University
NASA-Hampton University MSET Program

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This report highlights the first summer program activities. The summer program enhances the basic skill level of the students to jumpstart their academic careers at Spratley Middle School and to build a technical foundation that can be incorporated into their fall enrichment experiences.

Student Selection Process

Twenty-five students were selected for the NASA-Hampton University MSET Program. These students were chosen from a candidate pool of 42 rising Spratley middle scholars screened by a Hampton University/Spratley Middle School Review Committee. This preselected pool of students met all of the criteria outlined in the original proposals-that is, students were selected based on the Hampton City School System's placement of students in its Free and Reduced Lunch Program and Free Bus Program. In its final screening, the committee considered such factors as (1) self-nomination data, (2) parent nomination survey, and (3) teacher/principal nomination.

Objectives

The two objectives of the summer program were as follows:

- Enhance student mathematical and science skills in a relaxed setting
- Introduce students to the scientific method and have them perform experiments that they can scale up during the academic year into a major science project

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Jackson State University Precollege Awards for Excellence in Mathematics, Science, Engineering and Technology

Overview

The scope of the project was a 4-week intensive summer program and a Saturday Academy program. Activities were planned to stimulate interest and enhance motivation of the students through hands-on laboratory activities, demonstrations by university faculty, computer applications of mathematics and science, the application of mathematics and the solving of problems in the sciences, and the use of communications skills to interpret and communicate mathematical scientific concepts.

Techniques and approaches included motivational and scientific speakers and field trips to scientific landmarks, such as NASA's Stennis Space Center and the Aquarium of the Americas, to introduce the middle school students to careers in the sciences. There were demonstrations by university faculty, interactive sessions with parents, the mentoring of students on the scientific method in the development of science fair projects, and interactive classroom presentations.

The program culminated with an awards ceremony for participants, parents, and staff. During the ceremony, the participants received certificates for participation, as well as trophies, plaques, ribbons, and certificates for outstanding achievement/performance in the various components of the project.

Objectives

The primary objectives of this PACE project were as follows:

- Identify and recruit rising seventh and eighth graders interested in mathematics and science
- Expose and provide various approaches to the study of science, mathematics, computer science, and writing skills
- Expose students to professionals in these areas and help them explore career options
- Provide experiences not included in the regular school curriculum
- Increase students' awareness of the academic preparation necessary for such careers
- Contribute to students' confidence in their ability to make career decisions
- Acquaint students with the environment and resources of universities, colleges, and research organizations

Jarvis Christian College
NASA Center for Academic Excellence

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Overview

The Jarvis Christian College NASA Center for Academic Excellence is a 6-week precollege preparatory instructional program in science, engineering, mathematics, and computational science for 30 underrepresented minority and/or disabled students at targeted high schools within the Tyler and Longview Independent School Districts. Through group and individual instruction, field and laboratory work, site visits, parental involvement, guest speakers, test preparation, and other special programs, high school students received academic instruction, as well as personal and career guidance through programs specifically designed to meet the needs of each participant.

Each year, the program enrolled 30 participants. The core curriculum included biology, algebra, technology (computer science) and preengineering during the 1995–96 year; trigonometry/geometry, chemistry, technology (computer science), and engineering during the 1996–97 summer component; and physics, precalculus, technology (computer science), and engineering during the 1997–98 summer component.

Through this NASA award, 30 young minority students were recruited from the Tyler and Longview Independent School Districts. Students enrolled in the program were entering the ninth, 10th and 11th grades. The 1997–98 program ended with an educational trip to Washington, D.C., and NASA's Goddard Space Flight Center in Greenbelt, Maryland.

Program Goals

1. To engage young minority and/or disabled students in scientific-, mathematical-, and technological-related activities that will promote and strengthen the participants' interest in pursuing enrollment in precollege preparatory courses throughout middle and secondary school:

- During the 1997–98 program, the program participants consisted of 11 African-American females and 19 African-American males.
- **Scientific Activities** included instruction in scientific methodology, gross human anatomy and physiology, proper laboratory procedures and safety, environmental preservation issues, and career exploration.

PACE Programs

Jarvis Christian College
NASA Center for Academic Excellence

- **Mathematics Activities** included problem-solving strategies using basic mathematical computations and moving into algebraic equations using the professional standards developed by the National Council of Teachers of Mathematics (NCTM) in 1991.
- **Technology Activities** included a basic overview to computer programming and simulation activities correlated with the science and mathematics instruction.
- Students were engaged in **Career and Self-Exploration Activities,** during which they set personal goals for engaging in MSET-related courses through the completion of high school.
- Students participated in a **Scientific Reading and Research** course, which introduced them to the principles of literature searches, statistics, and technical writing.

2. To increase the number of minority and/or disabled students who receive bachelor degrees from Jarvis Christian College in MSET-related fields:

- Although it is too early in the program to definitively measure the success of the program according to this goal, the students left the program excited about participating in high school science and making plans for postsecondary education and MSET-related fields. The program participants attending the NASA summer session are rising ninth, 10th, and 11th graders. Statistical data will be available immediately following graduation from their perspective high schools.

3. To increase student interest and exposure to scientific-, mathematical-, and technological-related curricula that foster a lifelong interest in these subjects:

- Students took a walking tour of the Space Telescope Operations Control Center and NASA Communications Center at Goddard Space Flight Center at Greenbelt, Maryland.
- Five very motivational speakers visited with students about current career issues and careers in science, mathematics, and computer science:
  - Carolyn Harvey, RN, Ph.D., Executive Director, National
  - Black Leadership Initiative on Cancer, University of Texas
  - Health Center at Tyler, Tyler, Texas
  - Otis Webster, Ph.D., Psychology Professor, Tyler, Texas
  - Jerome Milton, M.S., Motivational Speaker, Tyler, Texas
  - Moshin U. Patwary, Ph.D., and Krishna Puttaparthi, Ph.D.
  - Jarvis Christian College, Texas Consortium for Water Quality Research

Jarvis Christian College
NASA Center for Academic Excellence

4. To encourage the exploration of MSET options as choices for higher education and career goals:
- A personality inventory was conducted to determine the compatibility of the students to MSET careers.
- Throughout the program, students were exposed to undergraduate MSET students and faculty.
- Students were encouraged to explore different MSET careers through scientific reading and historical research.
- The students applied mathematics to real-life career-oriented problem solving.
- Students participated in a career exploration class every other week.

5. To provide a forum for personal exploration and reflection of societal stigmas attached to minority and/or disabled persons' involvement in MSET fields of study and careers:
- At Goddard Space Flight Center, most of the scientists narrating the tour on the video monitors were minorities.
- Students were provided positive minority role models through the guest speakers, instructors, tutors, and dormitory monitors.
- The students participated in a program using science, mathematics, and computer laboratories on the college campus.
- During the career exploration course, successful African Americans in MSET fields were highlighted.

6. To teach transferable skills while promoting a sense of linkage between exposure to these skills and their relation to daily living:
- Many of the skills learned in class were applied to real-life situations, whether through discussion or hands-on application, such as creating and using personal budgets throughout the program.
- Computational skills were used for practical applications, such as letter writing, maintaining a simple budget, and organizing a data base.

7. To produce a science, mathematics, and computer science handbook suitable for use high school precollege courses and/or future summer MSET-related programs:
- Materials that were used during Level I, II, and III (third-year) classes have been collected to formulate that portion of the book.
- An outline of procedures has been implemented on a continuous basis, and student data collection protocols are occasionally revised.
- The projected completion date for the project handbook is the latter part of the third year.

Jarvis Christian College
NASA Center for Academic Excellence

8. To develop an evaluation and tracking method by which participants' subsequent academic success, course selections, academic progress in secondary school and college, and future career choices can be followed:

- A data base has been developed with the following tracking fields:
  - Name
  - Address
  - Ethnicity
  - Gender
  - Disability
  - MSET courses taken
  - Grades
  - Career choice
  - College entrance
  - College major
  - College GPA
  - Highest academic level completed
  - College degree

During the first program year, there were no significant changes in the approach, nor were there any critical implementation challenges anticipated during the 1998 program.

Enrollment Data

Participants in the 1997–98 program were from Boulter and Dogan Middle Schools and John Tyler High School of the Tyler Independent School District and Longview High School of the Longview Independent School District. Six of the students were ninth graders, 18 were tenth graders, and six are 11th graders. Eleven of the participants were females, and 19 were males; all the students were African Americans. Recruitment strategies included sending brochures, information, and application packets to principals and counselors at the target schools that invited them to nominate students with an interest in the areas of mathematics, science, computer science, and engineering. Potential students were asked to write a brief essay about their interest in the sciences. In addition, grades and letters of recommendation from teachers were used. An advisory committee composed of public school and college teaching faculty screened the pool of applicants and select the 30 students.

Accomplishments

Results

At the time of this report, the evaluation was in the process of being conducted. All the participants were enrolled in grade-appropriate mathematics and science courses to ensure preparation for college study.

Jarvis Christian College
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Lessons Learned

The students were very receptive to scientific and mathematical activities that included problem-solving strategies using basic mathematical computations and computer simulation activities correlated with the science and mathematics instruction.

Issues/Challenges

It was difficult getting all the parents to participate. The program was unable to recruit Hispanic and disabled students. It was also difficult getting sophomore and junior students to stay in the program because of the students' need to work during the summer.

Student Achievements

All of the students were enrolled in precollege preparatory courses designed to further increase the level of interest and knowledge careers in science, mathematics, and computer technology. The students also achieved an understanding of MSET careers through guest lecturers, who challenged the participants to take advantage of the NASA program and used personal and professional experiences during their presentations.

Partnerships

The success of the MSET program largely depends on cooperative relationships with organizations and individuals providing experiential information to program participants. The concept of partnering with these entities has been implemented. During the past, the following organizations have been involved in partnering with MSET to provide informative seminars and experiences for program participants:

- Jarvis Christian College NASA Center for Academic Excellence
- Goddard Space Flight Center, Greenbelt, Maryland (field trip)
- Jarvis Christian College Research Laboratory (laboratory exercises)
- Tyler Independent School District (students and curriculum materials)
- Pittsburg Independent School District (transportation)
- Hawkins Independent School District (curriculum materials)
- Texas Consortium for Water Quality Research (demonstrations)
- University of Texas Health Center at Tyler (guest lecturers)

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Lincoln University
Lincoln Advanced Science and Engineering (LASER): Early Alert

Funded by NASA, the Office of Naval Research, and other sources, the Lincoln Advanced Science and Engineering (LASER) Program employs a comprehensive plan to increase the number of well-prepared minority students seeking a Ph.D. degree in science, engineering, and mathematics (SEM). This preparation begins with the precollege component, known as "Early Alert, which seeks to motivate minority students in grades 7 through 12 for possible careers in science, engineering, and mathematics. The specific goals of Early Alert are to:

- Motivate minority precollege students to pursue undergraduate studies in science, engineering, and mathematics
- Motivate minority Early Alert students to apply to the 10-week LASER Summer Bridge Program
- Provide support services and exposures that will increase the likelihood of the students' success in technical careers

Early Alert is held in Philadelphia on Saturday mornings. Each grade has one lead instructor, one technical professional, and at least one LASER mentor. Students in grades 7 through 12 review concepts in mathematics, biology, chemistry, physics, engineering, and computing, respectively. The students are encouraged to participate in local science bowls and poster sessions. Outstanding students in grades 10 and 11 are invited to participate in a 3-week Early Alert Summer Program, which is held on Lincoln University's main campus and encourages the students to develop individual projects, such as how to design and launch a rocket. The eligibility requirements for Early Alert are:

- At least a 2.50 grade point average in the middle and/or high school
- Three letters of recommendation
- An interview with the LASER staff

The LASER Summer Bridge Program offers a well-structured curriculum and a supportive environment to help students make a smooth transition to college. The students are provided with textbooks, academic support, counseling services, parent and mentor support groups, field trips, and guest seminars by minority professionals. Students can earn up to 18 college science, engineering, and mathematics credits during the summer. Successful students in the Summer Bridge Program receive merit-based scholarships in the freshman and sophomore years at Lincoln. The Academic Year Program has activities similar to those in the Summer Bridge Program. LASER students are required to participate in off-campus research experiences to remain eligible for a scholarship. After the sophomore year, a select number of outstanding students may apply for LASER fellowships in their junior and senior years. LASER fellows are required to participate in on-campus research activities, special programs, and graduate school enrichment activities.

National Hispanic University
Cientificos 2

The Cientificos 2 Project, during its second year (January 1, 1997–December 31, 1997), formulated its objectives and activities based on the following goals:

- Increase the college-going rate among socially and economically disadvantaged and disabled high school students residing in the City of San Jose and their level of preparation for college studies in math, science, engineering, and technology
- Improve the mathematics, science, and technology literacy among the same targeted high school students

The goals of the project during its second year were successfully addressed by implementing (1) the Academic Year Saturday Academy utilizing Peer Advisor Learning Skills (PALS) tutors and math and science instruction and (2) the Summer Enrichment Academy. The project was implemented in collaboration with the Upward Bound Program, a precollege program of the National Hispanic University with similar but distinct goals and services. The collaboration between Cientificos 2 and the Upward Bound Program added more advanced math and science curricula, including algebra 1, geometry, overview to calculus, and biology. Also, additional faculty were hired with the Cientificos grant, strengthening the math and science precollege component.

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Northwest Indian College NASA Seaquest 1998 Annual Report for Northwest Indian College

Overview

Seaquest is a program for Native American youth sponsored by NASA at Northwest Indian College. The primary goal of the program is to increase the number of Native American students who pursue 4-year degree programs in the areas of math, science, engineering, and technology. Seventy-six students participated in the program: 21 participated in the Seaquest Peer Tutoring Program during the academic year and 55 participated in the 6-week summer Seaquest Program.

Outcomes

During the summer of 1998, Seaquest offered three different modules. Each module, containing approximately 18 students, focused on a topic in science through an integration of lecture, computer applications, and reading and writing taught in the mornings. Each afternoon, the students ventured into the field and reinforced the morning's lessons with hands-on activities. Below are detailed descriptions of each module.

The Northwest Indian College Seaquest Program.

Module 1: Investigating Marine Ecosystems

This course is a 6-week overview to marine biology and oceanography. The purpose of the course is to help students form a basic understanding of marine ecosystems and to acquire useful laboratory skills. The course also offers insight into methods of scientific inquiry and encourages the use of reasoning. The field experience was as follows:

- Scuba Training—The students went through scuba training to receive their open water scuba (P.A.D.I.) certification. They also visited marine laboratories and museums in the area, strengthening their knowledge of the ocean's biome.

Module 2: The Reinstatement of Humanness Through Restitution of Nature

The lecture series of this class was video recorded and offered to distance learning sites. The objective of this course is to provide a scientific framework to address environmental issues relevant to the people of this region. Special emphasis is given to the cultural and historical facets of these issues. The students conduct field and research work with tribal employees and other professionals

that complement and further strengthen their studies. These work sites are designed to involve students with hands-on applications of the science curriculum and to gain real-life experience bettering the condition of their local environment. Also, it is the mission of the program to foster a broader vision and enthusiasm for the field of science. The field experiences were as follows:

- Lummi Seaponds—The students participated in the operations of the Lummi Aquaculture facility. Also, each student conducted independent research at the facility and presented their findings at the end of the 6-week session.
- Anderson Creek Stream Restoration—The students worked on a stream restoration project on Anderson Creek. The health of this stream concerns the Nooksack and Lummi Indian Tribes because it is the habitat for endangered species of pacific salmon.

Module 3: Watershed Ecology and Alternative Energy Resources

The theme of this course is watershed ecology. Students study the Lake Whatcom watershed to gain a critical understanding of the watershed concept and its use in land management practices and effective environmental protection. Lake Whatcom supplies freshwater to industry around Bellingham and to the population of Bellingham and some unincorporated parts of Whatcom County. The students learn about organic farming, alternative energy resources (such as solar power), river ecology, water quality testing, and ethnobotany. They will then understand how practices on the land can lessen impacts on watersheds and preserve their health. The field experiences were as follows:

- The River Farm for 3 weeks—The students studied at an organic farming community, learning about sustainable agricultural practices, alternative energy resources, natural building, low-impact hydropower projects, and sustainable forestry practices.
- Sailing and Kayaking Instruction for 3 weeks—The students studied the watershed from inside of it, completing a sailing certification course and also gaining experience in kayaks.

Fifty-five Native American youth participated in the fifth annual Summer Seaquest Program at Northwest Indian College. These students came from 12 area schools and represent the Swinomish, Nooksack, and Lummi Indian Tribes.

Northwest Indian College
NASA Seaquest 1998 Annual Report for
Northwest Indian College

The Northwest Indian College Seaquest Program.

PACE Programs

The numbers of students from area schools who participated in the 1998 NASA Summer Seaquest Program are as follows:

High School	Location	Number of Students per Year				
		1994	1995	1996	1997	1998
Lummi Tribal High School	Lummi Reservation	4	12	10	11	5
Ferndale High School	Ferndale, WA	13	15	16	12	17
Bellingham High School	Bellingham, WA	1	3	3	1	3
La Conner High School	LaConner, WA	11	9	6	2	1
Anacortes High School	Anacortes, WA	1	1	0	0	0
Mount Baker High School	Deming, WA	1	10	3	3	5
Mount Vernon High School	Mount Vernon, WA	1	1	0	0	0
Nooksack Valley Jr. / Sr. H.S.	Everson, WA	0	4	0	3	7
G.E.D. Instruction,	Nooksack Tribal Center	1	0	0	1	0
G.E.D. Instruction,	Northwest Indian College	0	0	1	1	0
Not attending school		0	0	0	2	0

Middle School	Location	Number of Students per Year				
		1994	1995	1996	1997	1998
Vista Middle School	Ferndale, WA	1	9	2	5	8
Lynden Middle School	Lynden, WA	1	0	0	0	0
LaConner Middle School	La Conner, WA	0	0	0	2	0
Lummi Tribal School	Bellingham, WA	0	3	5	2	0
Mount Baker Middle School	Deming, WA	0	0	0	4	5
Total Number of students		**35**	**67**	**46**	**47**	**53**

Area high schools once again agreed to award high school credit for courses offered in the NASA Seaquest Program.

Two students were selected from this year's summer program to attend the NASA Space Academy in Alabama. The staff nominated students who exhibited excellent work ethics, a positive attitude, and a strong standing in the academic coursework of the NASA Summer Seaquest courses. These students will get an up-close look at what NASA has to offer as far as careers in science. Fifteen students are concurrently participating in the 1998 NASA Summer Seaquest Program and Summer Youth Employment Programs. Together, these programs offer opportunities for high school credit and job training.

Seaquest Peer Tutoring Network

During the 1997–98 academic year, 21 students participated in the Seaquest Peer Tutor Program and enjoyed tutoring on an individual basis with 14 Native American College students. Although many of the booths were geared toward current college students, the two Seaquest students who attended this event got ideas for the future. The Seaquest Peer Tutor Program collaborated with the groups below in its first year:

- The University of Washington's MESA Program
- The University of Washington Educational Talent Search
- The Swinomish Bridge Program
- Lummi High School
- Lummi Youth Outreach Task Force
- The Nooksack Tribe Learning Center

The Northwest Indian College Seaquest Program.

PACE Programs

- Western Washington University's Native American Peer Mentoring Network
- Northwest Indian College's Y'ae Tenges Program (Peer Mentoring)

Three tutoring sites were implemented servicing 21 Native American high and middle school students. The program exceeded its goals of 10 tutors and 20 students in its first year, servicing 21 students with 14 tutors, 11 of whom are Native American college students. The Seaquest Peer Tutoring Program received financial support from the University of Washington's MESA (Mathematics, Engineering, and Science Achievement) Program. Thus, the tutors were able to work more hours than originally thought possible, and the students benefited by accumulating "study bucks." The students received these "study bucks" when they showed commitment to excelling in academics in the following ways:

- Consistent attendance at tutoring sessions
- Valiant effort made during large assignments
- Effort made on studying hard for quizzes and tests
- Engagement in positive activities either in school or in their tribal communities

An assessment of each student's academic profile (grade point average and educational goals) was made upon entry into this program and is being analyzed now at the end of the academic year to mark improvement. Tutors will be selected from the Northwest Indian College and Western Washington University. The tutors will keep a journal of the student's progress and commitment to education. Students who are assigned tutors will be required to miss no more than three weekly tutoring sessions over the academic year.

The Future

The next academic year holds in store the following main goals for the NASA Seaquest Program:

1. Ten peer tutors will work with 25 high school students for the entire academic year. The program will utilize the existing Northwest Indian College site coordinators at each of the existing distance learning sites to work in collaboration with local middle and high schools to expand the peer tutor program.

2. Effective outreach will be made by the Northwest Indian College Extension site coordinators to recruit students and train staff for the upcoming satellite science course to be taught during the NASA Summer Seaquest Program in 1999. These existing site coordinators are familiar with local Native Americans who work with students in the area high and middle schools and will be most effective at ensuring the success of future courses offered over the satellite.

Northwest Indian College
NASA Seaquest 1998 Annual Report for
Northwest Indian College

PACE Programs

3. The sixth NASA Summer Seaquest Program will provide intensive summer science education to another 50 Native American students.

4. Continued emphasis will be made to integrate the morning lectures with the afternoon field experiences.

5. The English component in the Summer Seaquest Program will be replaced with a mathematics component designed to strengthen the students' confidence and skills in this area. This will help them feel more prepared to sign up for the challenging math, science, engineering, and technology courses offered in their high schools.

Pasadena City College Academic Enhancement Project

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Overview

In 1996, NASA's MURED sponsored Pasadena City College to provide an academic enhancement project for minority students from four middle schools. Pasadena Unified School District students attended classes for 11 Saturdays, February 22 through May 31. Students met for 4 hours per Saturday. The core courses covered were mathematics/computer studies, (general) science, and engineering and technology. The coursework pointed scholars toward an annual theme (for example, in 1997–98, the theme was "Telepresence and Remote Sensing"). This project was enriched by the continuous access to scientists, engineers, staff, and technicians from the Jet Propulsion Laboratory, Pasadena City College, and the Pasadena Unified School District.

Major Strategies

The Saturday instruction incorporated technology, hands-on learning, an Orange County Marine Institute field trip (simulated teleconferencing and broadcasting of marine biology research), problem solving, and skills development. The program has a strong academic linkage to high school, with an eye beyond to college. The program provided mentoring and exposure to career options. The program involved parents, the community, and Pasadena City College teachers. During 1997–98 a new service called the Family Forum offered enrichment workshops for parents and guardians.

Tracking

A data base provided by Pasadena Unified School District tracks scholars by name, address, ethnicity, gender, grades, career choice, college entrance, college major, and highest academic level completed.

Future Goals

The project will continue to offer introductory, review, and hands-on participatory projects for young minority and/or disabled scholars into math, science, engineering, and technology core areas. Activities are designed to promote and strengthen their desire to pursue enrollment in precollege preparatory courses throughout middle and secondary high schools. The project's long-term goal is to increase the number of minority and/or

PACE Programs

Pasadena City College
Academic Enhancement Project

disabled scholars who receive associate degrees form Pasadena City College and surrounding community colleges and bachelor degrees from the State universities and private universities in the core areas of math, science, engineering, and technology.

The classes were limited to a teacher/staff-to-student ratio of 1/20. Pasadena City College students are hired as staff—that is, technical assistants. NASAPSA (grades 7–9) is a bridge program that links the Pasadena Unified School District elementary school "Saturday Science Academy" (grades 4–6) and the high school academies (grades 11–12).

Southwestern Indian Polytechnic Institute Upward Bound/NASA Project

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Overview

The Southwestern Indian Polytechnic Institute Upward Bound/NASA project motivates and enables precollege students to complete high school successfully, to enroll and complete a degree program at a postsecondary institution, and to choose a career in math, science, engineering, and technology. The project has the following objectives

- Seventy-five percent of the students will enroll in college prep classes in the math, science, engineering, and technology area.
- Seventy percent of the students enrolled will earn a grade of "C" or above.
- Fifty percent of the graduates will score 18 or better on ACT.
- Fifty percent of participants will score at or above the 40th percentile on standardized tests.
- Fifty percent of the parents will attend workshops.
- The average grade point average will increase from 2.8 to 2.9.

Eighty students participated: 28 males and 52 females; 79 Native Americans and 1 Hispanic; and 8 rising ninth graders, 30 rising 10th graders, 20 rising 11th graders, 18 rising 12th graders, and 4 graduates, with 3 of the graduates enrolled in postsecondary education. In addition, of the six previous graduates, three are currently enrolled in postsecondary schools.

Outcomes

The following are the outcomes of the project:

- Sixty students (75 percent) are enrolled in college prep math, science, engineering, and technology classes.
- Forty-six of the 60 (77 percent) enrolled earned a grade of "C" or better in college prep classes.
- Of the 10 students who have ACT scores, 3 (30 percent) scored 18 or above.
- Twenty-five percent of the student standardized composite scores are above the 39th percentile.
- Approximately 65 parents attended either the orientation work shop or the exhibition fair.
- The average grade point average increased by 0.2 to 3.0.

PACE Programs

Southwest Indian Polytechnic Institute
Upward Bound/NASA Project

Outstanding partnerships with New Mexico Tech Net, Inc., J & M Enterprises, and Express Scripts/Value Rx enabled 30 students to rebuild and upgrade donated computer system parts, thereby taking a working computer system home. Partnerships with Intel, Sandia National Laboratories, Los Alamos National Laboratory, and the University of New Mexico enabled the project to locate and hire excellent scientists and to conduct indepth field trips and career exploration. Partnerships with schools and tribes allowed for advertising, recruiting for, and implementing the project using their onsite school space and resources.

Critical issues include low standardized test scores, first college semester failures and dropouts, and difficulty in tracking students.

John B. Harrington, a Native American Astronaut, shares breakfast with Southwestern Indian Polytechnic Institute Upward Bound/NASA students during field trip to Johnson Space Center in Houston.

Southwestern Indian Polytechnic Institute Upward Bound/NASA Astronomy Module students launch rockets that they built.

St. Augustine's College Summer Science Camp

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Overview

St. Augustine's Summer Science Camp is a joint effort between the college, Raleigh's public Enloe Magnet High School, and the nonprofit Higher Education Extension Service. The goal of this collaborative camp is to encourage those students who have traditionally been underrepresented in the sciences to develop a life-long interest in mathematics, science, engineering, and technology (MSET) areas and to enroll and succeed in mathematics and science courses that will prepare them for MSET college majors.

The Summer Science Camp is an enriching and exciting summer program with academic year follow-up activities. The summer component is a 4-week commuter program and simulates a college experience, offering classes in science, mathematics, communications, computer literacy and test-taking and enlivened by the addition of NASA materials, "hands-on" laboratory and computer work, presentations by science professionals, and field trips to nearby technical sessions. The support for campers is ongoing. Academic year activities include tutorial sessions in mathematics, science, and English for camp participants, as well as a networking program each semester. The networking program for the fall of 1997 was held on October 28 for student participants and their teachers, parents, and friends. A North Carolina State University Mission to Mars researcher, Dr. Jerold Walburg, was the guest speaker for that program. The networking program for the spring of 1998 featured, Dr. Leo Edwards, a mathematician from Fayetteville State University.

Students are eligible to continue in succeeding summers. Upon entering college, camp participants will be given priority in St. Augustine's National Science Foundation Alliance for Minority Participation Summer Bridge Program and for the alliance's college scholarships and paid research opportunities. To evaluate the program, participants' course taking, grades, and scores are compared to those of a carefully constructed control group. The results indicate that camp participation has had a positive impact on student achievement, particularly in their science courses.

Enrollment Data

The camp will enroll up to 60 African-American ninth through 11th grade "graduates" of the college's Saturday Science Academy for sixth through eighth graders and from Enloe Magnet High School by the end of the project. Each year, applications are

St. Augustine's College
Summer Science Camp

accepted from students exiting ninth grade at Enloe Magnet High School. Twenty students are selected each summer. The initial 20 come back the remaining summers, while a new 20 are added each year of the project. Targeted groups are those students with grades of "C" or better in all high school mathematics and science courses. In particular, the camp looks at those students from underrepresented MSET career areas. The participants are chosen for their potential for success in demanding MSET courses. During the summer of 1998, the camp had 18 students return from the first year camp and 20 new campers enroll.

Accomplishments/Partnerships

An intense year of planning culminates with the summer camp being carried out during the weeks of June 15 through July 10. Two St. Augustine's faculty and two teachers from the partnering school, Enloe Magnet High School, teach content area classes. The project evaluator, Ms. C. Morning is from the partnering non-profit organization, the Higher Education Extension Service. Enloe Magnet High School Principal Lloyd Gardner maintains close ties through program attendance and support.

Stillman College
Summer Science Camp/Saturday Academy

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Overview

The Stillman College NASA PACE/MSET Program consists of a 6-week Summer Science Camp and a Saturday Academy. The Summer Science Camp focuses on classroom instruction and hands-on laboratory enrichment activities centered on mathematics, physics, chemistry, computer science, and biology. It also includes science enrichment field trips and seminars. The Saturday Academy focuses on tutoring in math/science courses, writing, and SAT/ACT preparation.

Objectives

The objectives of the project are as follows:

- Encourage high school students to take more math/science courses
- Motivate high school students to pursue careers in MSET fields
- Improve the students' level of competence in math/science by at least 25 percent
- Provide direct contact with mentors who will motivate and encourage students to pursue careers in MSET fields
- Get parents more involved in their children's education

Recruitment Strategies

The director of the project visits the school campuses and takes applications, issues announcements, and gets recommendations from high school math/science teachers.

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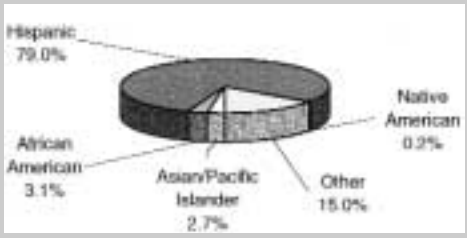
University of Texas at El Paso Excellence in Technology, Engineering and Science (EXCITES)

Overview

Completing its third and final year of funding, Excellence in Technology, Engineering and Science (EXCITES) has not only met its original goals and objectives, it has also occasioned any number of serendipitous events that have carried its impact well beyond anything that may have ever been expected. The objectives of EXCITES are to:

- Excite and nurture the interests of a broad spectrum of minority students in science, engineering, and mathematics
- Provide committed/highly motivated students who demonstrate high potential with sustained nurturing and support
- Support and strengthen the capacity of local high schools to prepare students for college-level coursework

Enrollment by Ethnicity



EXCITES now offers three summer programs based on the classification of the student participant. The entry point, or summer kickoff program, is the summer between a participant's freshman and sophomore years (that is, rising sophomores). As students return during subsequent summers, they participate in advanced summer camps that increase in intensity and rigor and are designed to challenge the students' critical thinking skills and to broaden their experience in engineering and science.

The second major activity of EXCITES involves a series of planned activities conducted throughout the academic year. Otherwise known as synergizers, these fully engage high school students in engineering- and science-related activities that are clearly rigorous and challenging. Specifically, the synergizers engage high school students in local, regional, and statewide design competitions and their related support activities (such as mentoring). The total number of high school students participating in EXCITES was 519 students: 40 percent female and 85 percent minority (see the charts).

Outcomes and Partnerships

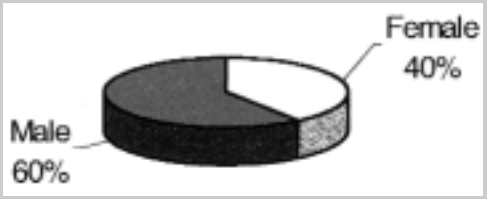
Over the last 2 years, the synergizer activities have engaged teams of students from various high schools across the community in addressing an engineering design problem that has been developed and disseminated by the Texas Society of Professional Engineers (TSPE) annually as part of a statewide competition. Moreover, in the summer, EXCITES participants have acted as

advocates for the TEC, supporting and encouraging the formation of several teams from their own high schools. Finally, because the EXCITES administration has been so successful at invigorating the pool of participating teams in the State of Texas, TSPE has recognized EXCITES as the State prototype and is committed to invest the time and resources to disseminate EXCITES as a model for all cities in the State. To this end, Dr. Juan Herrera, the EXCITES Principal Investigator, and tenured faculty in the Department of Mechanical Engineering at the University of Texas at El Paso, now serves on the TSPE/TEC statewide planning committee, and future plans call for teleconferencing Dr. Herrera's TEC-related lectures to participating schools and communities across the State.

Still, the program's accomplishments exceed even these exceptional developments and/or outcomes. Approximately 92 percent of the EXCITES graduates are college bound, with 41 percent intent on studying engineering and 24 percent studying science. Most notably, the very strong relationships that EXCITES and the university have nurtured with high schools across the city have given rise to several partnerships in the development of various magnet programs in each of the three major schools districts that focus on engineering and science. The prospect, then, of university faculty developing strong ties with high schools, providing valuable curricular input to the development of these magnet programs, mentoring participating teachers, and, most significantly, developing potential feeder schools for the university's engineering and science programs is compelling. In the fall of 1998, while the university experienced a minor decline in its enrollments, the College of Engineering witnessed an overall growth in excess of 6 percent and a 12-percent growth in freshman enrollments over the previous year. College administration is confident that these numbers clearly are because of, to a significant degree, the focused work of the EXCITES program.

University of Texas at El Paso
Excellence in Technology, Engineering and Science (EXCITES)

Enrollment by Gender



Bridge Awards

The partnerships fostered between secondary and postsecondary education give rise to the Bridge programs. Bridge awards are funded on an annual basis and range between $10,000 and $150,000. The average award, however, is around $70,000. Recipients are expected to leverage these dollars with funds from other sources to maximize their impact. These awards are generally made to colleges and universities that conduct academic enrichment programs most often for high school seniors and high school graduates preparing to enter postsecondary education. These enrichment experiences take a variety of forms, including class work, research, seminars, and so forth. The overall goals of such programs are to:

- Provide a smooth transition between secondary and postsecondary education
- Increase the enrollment of students in mathematics, science, engineering, and technology (MSET) disciplines
- Strengthen precollege students' MSET skills
- Encourage students to pursue MSET careers in the future

To achieve these goals, the programs often target students to successfully complete gateway courses, such as algebra, geometry, college preparatory mathematics, and science. They also establish collaborative efforts among the mathematics, science, engineering, technology, and education departments within the university and engage students in enrichment activities, such as research, the use of advanced technology, peer support groups, and mentoring relationships. The ultimate objective is to increase student awareness and participation in the MSET career world.

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University of Central Florida Success Program for Academic Careers in Engineering (SPACE)

Overview

The following objectives of the Success Program for Academic Careers in Engineering (SPACE) at the University of Central Florida were met:

- Offer a program in the central Florida area to significantly bridge the gap between high school and college for 25 students interested in studying engineering, science, and/or a related area
- Improve the academic performance of students
- Provide the students with the tools to become academically, socially, and psychologically successful
- Increase the number of minority students earning a grade point average of 3.0 or above during their first 2 years at the university

This 6-week bridge program is designed to offer students a realistic picture of academic life. The curriculum, taught by university faculty and graduate students, is extremely intensive. Twenty-five students were enrolled in the following as credit courses: Technical Presentation, Engineering Computer-Aided Design, and Overview to Engineering (a course designed and taught by engineering faculty mentors. Academic workshops are held in calculus and physics. The workshops and computer application classes are facilitated by university faculty, graduate students, and upper-level SPACE students. Weekly field trips to local industries are held for students to observe engineering and science in the workplace.

Enrollment Data

Twenty-five students attended the program, and 24 completed the program. All students are currently enrolled as full-time students in engineering and science. The 20 male and 5 female participants, which included 2 transfer students and 23 first-time college freshmen, represented the following ethnic groups: 5 African Americans, 13 Hispanics, 3 Pacific Islanders, and 4 Caucasians.

Bridge Awards

University of Central Florida
Success Program for Academic Careers in Engineering (SPACE)

Outcomes

A total of 132 students have participated in SPACE. Currently, there are two students pursuing doctoral studies. The program has a retention rate of 63 percent in engineering and science and an overall retention rate of 87 percent.

Eight scholarships were awarded to 1997 SPACE participants in recognition of their outstanding academic achievement during the 1997 summer bridge program and the fall semester.

Partnerships

The College of Engineering provides the faculty, facilities, and student registration. Local industries provide industry tours, lunch, and recognition banquets for students and parents.

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Xavier University of Louisiana
SOAR 2 Summer Bridge Program

Overview

Project SOAR, a 4-week summer program for prefreshmen, was initiated to help students develop the type of problem-solving skills needed to succeed in college-level mathematics and science, thereby increasing the number who can succeed in and choose a science-related career goal. SOAR is one of a series of six programs at Xavier that together constitute an educational pathway beginning at the eighth grade, continuing through high school, and leading into and through Xavier's science departments into science-related graduate and professional schools.

SOAR is unusual among programs developed by scientists because it attempts to develop problem-solving ability rather than to teach content. SOAR 2, the program for students interested in computer science, engineering, mathematics, or physics, has the following five components:

1. An inductive approach to laboratory experiments to improve general problem-solving ability

2. Specific instruction to improve those verbal and quantitative reasoning and critical reading skills used in comprehending mathematics and science textbooks, answering exam questions, and scoring well on standardized tests such as the SAT and the Graduate Record Exam

3. General vocabulary building

4. Group competitions to promote the development of the type of peer support system (based on academics) needed to succeed in highly competitive fields such as medicine, engineering, and science-related graduate schools

5. A selection of activities to inform and motivate students for careers in the targeted areas of computer science, engineering, mathematics, and physics, including hands-on applications labs and special science competitions involving the design, development, and demonstration of some model

Bridge Awards

Xavier University of Louisiana
SOAR 2 Summer Bridge Program

Objectives

SOAR's objectives are to:

- Increase the enrollment in Xavier University's Dual Degree Engineering Program
- Increase the college attendance rate of New Orleans and Louisiana students with the potential to succeed in science and engineering
- Increase the aptitude test scores of the "rising seniors" who participate in SOAR 2
- Provide increased access to engineering and science careers for students whose aptitude test scores would not qualify them for admission to other NASA minority student programs
- Increase grade point averages and retention and graduation rates of Dual Degree Engineering Program students
- Increase the number of students who are interested and prepared to succeed in engineering and science taught by their high school teachers who also participate (as instructors) in the SOAR 2 summer session
- Retain and graduate SOAR 2 students at rates that substantially exceed the national average for African-American engineering students

Enrollment Data

The total of 58 SOAR students is split equally between males and females. All are African Americans.

Student Achievements

The program has had the following accomplishments:

- Seventy-five percent of the participants have eventually enrolled in a science, engineering, or math major at Xavier.
- Sixty-five percent of the participants have enrolled at Xavier and have either graduated or are still enrolled in a science, engineering, or math major.
- Nineteen percent of the SOAR 2 participants have been selected as science, engineering, or math Undergraduate Research Fellows.
- Thirty-five percent of those participants who have enrolled in the university and graduated have subsequently enrolled in graduate school in a science-, engineering-, or math-related course of study.
- One former SOAR 2 participant has completed a Ph.D. degree in computer science, and another has completed a bachelor's degree in electrical engineering and an M.D. degree in neurosurgery.

Xavier University of Louisiana
SOAR 2 Summer Bridge Program

- Eight former SOAR 2 participants have completed master's degrees in a science-, engineering-, or math-related course of study, nine others are presently enrolled in master's degree programs in science-, engineering-, or math-related courses of study, and three are enrolled in doctoral programs.

Issues/Concerns/Lessons Learned

Bridge programs can significantly affect a student's ability to integrate into and negotiate academic process when that program focuses on the issues essential to the student's critical thinking. It is very necessary to approach students with a biconditional application. Those students who are marginal or deficient in certain areas because of the variable curricular scale and development must receive significant individualized support, including tutoring, minimum reward, and individualized "pep talking." Those students who are "gifted" and already excelling must be pushed to the maximum levels for them to develop academic stamina and focus on long-term goals. They should be encouraged to explore, invent, end develop creative lines of attack for problems. They must also be encouraged to remain with the team and group structure. All of these are integral parts of the SOAR 2 program's success.

Challenges

Students must be taught to focus on long-term academic and professional careers in a society that focuses on short-term gain. This needs to be done with the advent of forums and the presentation of older role models to get them to visualize life as more than just a day-to-day adventure. There must be an increase in the development and morale boosting of the teaching personnel. An increase in the facilities and resources available for student development of cognitive, exploratory, and inventive skills must also be addressed.

Additional Comments

The SOAR 2 program has resulted in an increase in the number of students who enroll in engineering at Xavier University, as well as the number of students who are eligible for advanced placement and are available to serve as tutors. It has also resulted in enhanced retention and significant contribution to the pool of candidates for the Future Scientists Program. This program is continuing to effectively open doors of opportunity for larger numbers of students to pursue engineering and related subjects, with a much greater probability of success than might otherwise have been available.

Undergraduate Scholars

NASA's Undergraduate Student Awards are designed to enable minority institutions to use NASA's unique capabilities and resources in science and technology to contribute to science, mathematics, and technology education. The Agency funds a number of training programs that enable minority institutions to develop math, science, engineering, and technology (MSET) undergraduates in training under NASA research grants. Other university-centered education and training programs include support for targeted groups in minority institutions of higher education that serve as a significant national resource for the space program and other critical national scientific and technological endeavors.

The NASA MUREP Undergraduate Student Awards are funded through education grants for Undergraduate Researchers and Graduate Researchers. The most prominent programs currently funded by NASA are identified below. Our intent is to further the public's understanding of NASA's investment in promoting educational excellence and to illustrate NASA's policy to support science, mathematics, and technology education to meet the country's future needs for scientists and engineers.

Undergraduate Researchers Awards

Bowie State University
Model Institution for Excellence

The Model Institutions for Excellence (MIE) initiative is an institutional development and demonstration program that was established as a model for educational reform in science, engineering, and mathematics. The goal of the MIE program is to create well-informed, well-trained minority graduate students in the fields of science, engineering, mathematics, and computer technology. Summer institutes in engineering and computer applications are also provided to enhance skills and knowledge. MIE scholarships provide for tuition, fees, and research stipends. Bowie State provides $2,000 for tuition. NASA provides a $6,000 stipend for undergraduates and a $7,000 stipend for graduates. There is a guaranteed summer internship worth $3,000.

Florida A&M University
Increasing Minority Access to Graduate Engineering

The goal of Increasing Minority Access to Graduate Engineering (IMAGE) is to recruit and enroll African Americans in programs leading to Ph.D. degrees in engineering. Project IMAGE was established at Florida A&M during the 1988 academic year as an outreach and retention program for minority engineering students with interest in NASA-related research. Scholars who receive the IMAGE awards are provided partial funding of their tuition and fee assistance, state-of-the-art computers and software, and technical and laboratory assistance. In addition, IMAGE scholars will

have the opportunity to participate in 10-week paid summer research internships at one of the NASA Centers.

Morehouse College
Project SPACE

Strategic Preparedness Advancing Careers in Engineering/Science (SPACE) is a scholarship program that offers high-achieving scholars the opportunity to pursue degrees in math, science, and/or engineering. Students under this program are known as "Ronald E. McNair Scholars," and NASA provides partial funding of the cost of their education for up to 5 years of undergraduate study. SPACE/Ronald E. McNair Scholars are provided ongoing academic support as well an opportunity to participate in 10-week paid summer research internships at one of the NASA Centers.

NAFEO Services, Inc.
Student Researchers Consortium

The NAFEO Consortium of Student Researchers Program was established in 1997 to recruit HBCU students for careers in science and engineering, to increase the pool of potential candidates for graduate school enrollment in science- and engineering-related disciplines, to foster collaborative relationships with NASA installations by providing students for research-based experiences, and to build a pool of candidates for future NASA employment. The program's scholars receive up to $8,000 for educational expenses and $4,000 for a summer research internship.

Spelman College
Model Institution for Excellence/Summer Science and Engineering Program

The Model Institution for Excellence (MIE) was established in 1995 via a cooperative agreement between Spelman College and Morehouse College Penn Foundation that is supported by NASA and the National Science Foundation. The MIE is an institutional development program geared toward fostering academic excellence through demonstration relative to the commitment of adequate resources, facilities, equipment, curriculum, and staff learning to student-centered learning. Scholars participate in a 6-week summer science and engineering program designed to enhance skills. MIE scholars receive funding for their educational expenses.

Undergraduate Scholars

Spelman College
Women in Science and Engineering

The Women in Science and Engineering (WISE) Scholars Program was established in 1987 to provide talented underrepresented female scholars the opportunity to pursue undergraduate studies in science and engineering. WISE scholars are provided a broad spectrum of academic enrichment and support service geared toward excellence and success: faculty mentors, tutors, specialized workshops, and seminars, as well as summer bridge programs. WISE scholars receive partial funding for their tuition, books, room and board, and stipends for summer research at NASA Centers.

University of Maryland at Baltimore County
Meyerhoff Program

The Meyerhoff Scholarship Program is a comprehensive intervention program established in 1988 via a philanthropic grant to increase the number of African Americans pursuing careers in the science and engineering fields. In recent years, the program has retained its viability through funding from NASA and the National Science Foundation. A 6-week summer bridge program is provided before the freshman year, which includes intensive coursework in science and mathematics. The Meyerhoff scholarship includes tuition and fees, room and board, a personal, computer and an annual stipend of $1,000. Furthermore, Meyerhoff scholars have the opportunity to participate in a 10-week summer research internship.

University of New Mexico
NASA Training Project

The goal of the NASA Training Project is to increase the availability of high-quality minority students (primarily Hispanics and American Indians) pursuing careers in science and engineering. The NASA Training Project is a recruitment and retention program comprised of three components. Of the three, the freshman component promotes the identification and recruitment of students with interest in science and engineering. NASA Training Project scholarships are awarded to students for partial funding of their tuition. Scholars are required to participate in a cooperative educational training experience as well as summer research projects.

Undergraduate Scholars Awards for Research

Undergraduate Scholars Awards for Research (USAR) is a grant program established by NASA in 1990 to fund minority institutions in support of undergraduate scholars in science engineering, mathematics, or computer science. The goal of the program is to foster diversity by developing a pool of talented scientists and engineers in fields related to NASA's mission. USAR scholars receive up to $8,000 for educational expenses and $4,000 for summer research internships.

American Association for the Advancement of Science Achieving Competence in Computing, Engineering, and Space Science (ACCESS)

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Overview

In 1998, Achieving Competence in Computing, Engineering, and Space Science (ACCESS), managed by the American Association for the Advancement of Science (AAAS) Project on Science, Technology and Disability, completed its third year as a summer internship program at NASA's Goddard Space Flight Center and its second year as an Agencywide program. ACCESS is designed to discover and develop talent among undergraduate and graduate students with disabilities who are pursuing technical disciplines. Building on a highly successful 1997 program that placed 19 students with disabilities at seven NASA sites, the AAAS expanded the program to include eight NASA sites, which offered internships lasting 10 to 12 weeks. Twenty-three students, studying at 21 colleges and universities, participated in the 1998 ACCESS program.

In addition to expanding the ACCESS program, the objectives for the summer of 1998 were to:

- Increase the diversity in discipline, disability, ethnicity, and gender among students with disabilities who participate in the ACCESS program
- Afford opportunities for college students with disabilities to utilize and develop their talents by working with scientists in highly technical research programs at NASA installations
- Work with NASA Centers to provide the assisting technology, such as computer peripherals, large print documents, or sign language interpreters, required by some students with disabilities for executing their job responsibilities with minimal assistance from others
- Prepare college students with disabilities for the rigorous work in an environment such as NASA
- Assist the students in adjusting to and coping with the social and personal responsibilities of an offsite living arrangement.

Undergraduate Scholars

American Association for the Advancement of Science Achieving Competence in Computing, Engineering, and Space Science (ACCESS)

Enrollment Data

The total number of college students with disabilities who participated in the 1998 ACCESS internship program was 23. Fourteen different disabilities were represented among the 23 students. Of these, 20 were undergraduates, and 3 were graduates. There were 18 males and 5 females. This group had 15 Caucasians, 4 African Americans, 2 Hispanics, 1 Native American, and 1 Asian.

Recruitment Strategies

The AAAS distributed ACCESS brochures and electronic announcements to directors of disabled student services offices at colleges and universities around the country and to the deans of all the engineering schools in the United States. ACCESS announcements were sent to programs for persons with disabilities funded by the National Science Foundation, HBCU's, vocational rehabilitation counselors, private organizations serving people with disabilities, career centers, and other disability organizations. AAAS staff made presentations at several science, engineering, and co-op education societies and at the annual meeting of the Association of Higher Education and Disability (AHEAD).

NASA installations around the country have worked for many years to achieve a workforce diverse in discipline, disability, gender, and ethnicity. The addition of college students with disabilities has greatly contributed to this diversity, bringing attention to the talents and abilities of a minority population often underrepresented in scientific initiatives. The ACCESS program has proven that a high caliber of qualified students with disabilities can enter and succeed in the highly technical research jobs that are so crucial to NASA's success.

Student Accomplishments

In 1996, one of the seven student interns received an award for an outstanding presentation of his work during the final presentation week at NASA. In 1997, two students from the ACCESS program received awards; both were undergraduate African-American students with disabilities, interning at NASA's Goddard Space Flight Center. Also in 1997, three of the 1996 interns with disabilities returned to other summer programs at Goddard.

Undergraduate Scholars

In 1998, the following were accomplished:

- One student from the 1996 pool of interns was the first deaf student ever to win a Rhodes Scholarship.
- One student from the 1996 pool returned as a co-op student to Goddard.
- One student from the 1998 pool received a monetary award for best presentation of his work.
- Two students who had interned at NASA sites in 1997 accepted internships in 1998 at NASA sites other than the sites at which they had been in 1997.
- One student from the 1998 pool will return to NASA's Johnson Space Center as a co-op student.

American Association for the Advancement of Science Achieving Competence in Computing, Engineering, and Space Science (ACCESS)

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Bowie State University
Bowie State's Science, Engineering and Mathematics Education (BSEME) Reform: A Program of the Model Institutions for Excellence (MIE) Initiative

Overview

The Model Institutions for Excellence (MIE) initiative is a collaborative effort between the National Science Foundation and NASA. The overall goal of Bowie State's Science, Engineering and Mathematics Education (BSEME) reform program is to ensure that a higher number of students seek and complete advanced, quality education in science, engineering, and mathematics (SEM).

Bowie State's MIE initiative is an institutional development model, which encompasses the following educational reform components: Outreach, Retention, Educational Reform, Research, Linkages and Collaboration, Infrastructure and Human Resource Development, and Assessment and Self-Evaluation. Programs and activities within this model include but are not limited to the SEM Fellowship Program, the SEM Colloquium, the SEM Summer Academy, the Internship Program, MIE Faculty Grants, and the SEM Tutoring and Resource Center.

Enrollment Data

The overall enrollment for the SEM domain at Bowie State University during the reporting period was 431 undergraduate students and 81 graduate students. The MIE program has had both a direct and indirect impact on many of these students via infrastructure support, such as the SEM Computing Facility, the SEM Tutoring and Resource Center, and such student development and enrichment programs as the SEM Colloquium, site visits to research centers, and conference travel support. However, the MIE program directly sponsored (financially) 55 SEM fellows and 45 SEM assistants. The SEM fellows were provided stipends to support their fellowship assignments under the guidance and mentoring of faculty members. The SEM assistants were hired under a part-time contract to perform duties as tutors, lab monitors, and office assistants. The ethnic breakdown for the combined 100 fellows and assistants included 85 Africans or African Americans, 5 Pacific Islanders, and 10 Caucasian or other students.

Undergraduate Scholars

Bowie State University
Bowie State's Science, Engineering and Mathematics Education (BSEME) Reform: A Program of the Model Institutions for Excellence (MIE) Initiative

Outcomes

Overall enrollment for SEM undergraduate students increased by 9 percent from the previous year. First-year retention rates for SEM students are on a steady incline, rising from about 52 percent for the year prior to the establishment of the MIE initiative to about 65 percent during the 1997-98 academic year. More specifically, the MIE program awarded 55 fellowships to deserving and outstanding students. This was an increase in the number of awards, by 28 percent, from the previous year. More than 40 students were placed in internships at local, regional, and national Government, research, and corporate laboratories.

There were 36 student research presentations at national and international conferences, including two student papers that are slated to be published this year in reputable journals and/or proceedings. Also, the SEM Summer Academy enjoyed huge success with a first-year retention rate of 91 percent for those students who successfully completed the academy during the summer of 1997.

A new initiative started by MIE, the MIE Faculty Grants Program, was established to spearhead pilot research-based projects by faculty. These are small grants designed to provide faculty with the resources and foundation to pursue larger external grants as well as publish papers and present at conferences. In addition, a more fundamental objective is to provide junior faculty with experience in grantsmanship. During this reporting period, nine grants were awarded to faculty. Preliminary results show that there have already been a couple of papers published and/or accepted for publication in journals.

The Bowie State Satellite Operations and Control Center (BSOCC), a partnership with NASA and the first of its kind at any university in the country, has achieved much success in student training. BSOCC is a facility on Bowie's campus in which students are trained to control and collect data from a live satellite called SAMPEX. There were six SEM fellows assigned to BSOCC during the reporting period. In that time, three of the fellows achieved both Command Controller and Spacecraft Analyst certifications, while the three newest (and youngest-all were freshmen or sophomores) fellows to the BSOCC facility achieved Command Controller certification.

Several former SEM fellows have gone on to established careers in SEM and/or graduate school. For example, Rana Razzaque, with dual degree in math/engineering (class of 1997), is a network systems analyst with Exxon and is completing his master's degree in management computing sciences. Leonard Gyebi, with a degree in biology (class of 1997), is enrolled at Case Western Reserve Medical School. Taushaun Betts, also with a degree in biology (class of 1998), is a researcher at Life Technologies, where

Bowie State University
Bowie State's Science, Engineering and Mathematics Education (BSEME) Reform: A Program of the Model Institutions for Excellence (MIE) Initiative

she is engaged in top-secret DNA cloning research. Chris Gokey, a graduate in computer science (class of 1998), is a senior programmer analyst with Raytheon STX, where he is working on a directory information system for Earth and space sciences, which is a project funded by NASA's Goddard Space Flight Center.

Partnerships

This project currently has partnerships with NASA, the National Science Foundation, the Maryland Applied Information Technology Initiative (MAITI), Argonne National Laboratories, Life Technologies, the Dual Degree Engineering Consortium with University of Maryland at College Park, George Washington University, and Morgan State University. NASA provides funding for the MIE grant and sponsors summer intern programs, such as SIECA (Summer Institute for Engineering & Computer Applications), in which several of Bowie State's SEM students participate. The National Science Foundation collaborates with NASA on the MIE grant by providing funding to four of the six MIE schools as well as awarding the contract technical support to the MIE schools.

MAITI is a consortium of several Maryland universities to collaborate on an initiative to train a well-developed information technology workforce. Life Technologies just committed $40,000 for scholarships to biology students, and Argonne National Laboratories provides summer internship experiences for several of the SEM students.

This project is also working on partnership opportunities with research facilities, corporations, and graduate schools, such as Johns Hopkins University's Applied Physics Laboratory, Science Application International Corporation (SAIC), AlliedSignal Technical Services, Electronic Data Systems, Dynamac Corporation, the Census Bureau, the Lawrence Berkley Laboratory, the University of Virginia, the University of Minnesota, and the University of California at Berkeley.

Issues/Concerns

Some of the activities of the MIE initiative are maturing while new ones are launched. Clearly, the implementation and validation process of the MIE model continues. Preliminary results show encouraging trends in increased enrollment and improved retention. While some cautious optimism prevails, the project continues to learn from our experience, refine the model, and push forward with new programs. The most significant challenges that lie ahead are related to institutionalization. Building meaningful partnerships will help meet the challenge.

City College of New York
Network Resources and Training Site

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Overview

The objective of the Network Resources and Training Site (NRTS) is to provide underlying technology and training to support and enable NASA-related research and education programs in the partner campuses and schools. Most of the network infrastructure funding was used to support schools participating in the Institute for Climate and Planets (ICP) of the Goddard Institute for Space Studies (GISS). This effort is a collaboration among GISS, City University of New York, and New York City public schools engaging faculty, teachers, and students in climate-related research. NRTS funding is provided for MSET-wide connectivity to enable and enhance participation in the ICP and other NASA-related programs. The NRTS is also providing weather stations and training for the development of METNET/City College of New York (CCNY), a mesoscale weather network to stimulate interdisciplinary investigations of the urban heat island and other weather/climate phenomena.

Technological Accomplishments

During the first 2 years of the NRTS award, the priority campuses and schools were those without network infrastructure and/or dedicated Internet access. Network connectivity for MSET departments and divisions were completed for most of the NRTS partners. During Year 3, NRTS funds were used to facilitate network migrations for aging infrastructures at York College and to provide Internet access for the partner high schools. In partnership with the Manhattan High School Superintendent's Office, NRTS funds were also used to provide cabling and hardware for a pilot program for additional high schools launched on NetDay 1997. Two of the NRTS high schools were also selected to participate in a New York City cable modem pilot. The NRTS continued to provide regional technical support and training with workshops and courses.

Programmatic Impacts

With deployment of this technology, a number of weather and climate-related courses were enabled or enhanced by NRTS technology including climate-related research courses in all of the participating high schools, newly developed or restructured courses in meteorology and atmospheric science at Medgar Evers and York Colleges, and the integration of climate/weather-related data sets in computer science and math courses at CCNY,

Undergraduate Scholars

City College of New York
Network Resources and Training Site

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Brandeis High School, Maggie Dupuy
Bronx High School of Science, Mitch Fox
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Gompers High School, Maryann Hawthorne
MAST High School, Henrietta Fulliard

LaGuardia Community College, and Queensborough Community College. Approximately 35 additional schools now participate in the weather network project, which is intended to integrate real-time meteorological data in the Earth science curriculum and support student-based project investigations. Teacher training graduate courses are provided by CCNY faculty and include background in meteorology and remote sensing. In addition, participating teacher/meteorologists augment staff development training. The CCNY NRTS is collaborating with programs in the South Carolina State University NRTS and the Tennessee State University NRTS for the development of astronomy/space science research components for undergraduate and precollege students.

Partnerships

- ICP/GISS—NRTS funding has been used to provide connectivity required for site-based research and education programs at the participating colleges and high schools.
- Consortium for School Development /CCNY—Consortium staff work with the NRTS to provide basic Internet integration training for high school teachers and students.
- Cablevision—The cable company selected two of the NRTS high schools for the New York City cable modem pilot and is partnering with the NRTS in the weather network project.
- New York City Board of Education—Various units have collaborated with the NRTS and augmented funding for high school local area networks and computer labs.
- National Weather Service—This organization provides funding and support for the weather network project.

Undergraduate Scholars

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Fayetteville State University Undergraduate Scholars Awards for Research (USAR) Program

Overview

The Mathematics/Science Education Center at Fayetteville State University participated in the Undergraduate Scholars Awards for Research (USAR) Program for the academic year of 1997–98. Three students were allotted the opportunity to enhance their academic experiences and attend a 4-year accredited institution in their efforts toward achieving a degree under the NASA career field guidelines. Having met the qualifying guidelines, these students were linked with university professors in their discipline area.

Student Enhancement and Professional Activities

The Project Director began the school year with a welcome-back planning session with students and mentors in August 1997. Agenda items included: project requirements and expectations; getting reacquainted; course advisement; the creation of yearly planning tables (students' and mentor's course of action for the year); reporting documentation, revisions, and requirements; and NASA USAR requirements, changes, and updates. The students also had the opportunity to relate summer experiences to the entire group. Additional group activities for the academic year were as follows:

- Quarterly group (mentors and students) project meetings were held with the Project Director to discuss concerns, assist each other with subject difficulties, and serve as a support unit for one another.
- The students assisted with the implementation of special programs funded by NASA and hosted by the MSEN Precollege Program for students of grades 6 through 12 and their parents (for example, Math/Science/Technology Competition Day, the closing Awards Program, and summer programs). They assisted with the classroom instruction during the Saturday Academy in mathematics, science, electrical engineering, and computer science.

Undergraduate Scholars

Fayetteville State University Undergraduate Scholars Awards for Research (USAR) Program

- The students served as mentors for the shadowing program of the MSEN Precollege Program. This program provides mathematics and science academic enrichment services to students of grades 6 through 12 for a five-county region on Saturdays and during a 4-week summer enrichment program. It also assists the Mathematics/Science Education Center with special inservice and preservice programs for K–12 teachers and school administrators during the school year and during their summer program.
- The students presented their research before a group of university professors and students on the campus of Fayetteville State in November 1997.

As active NASA USAR participants, the students are exposed to all academic programs provided by the Mathematics/Science Education Center throughout the year. Interaction with center and university staff allows the students the opportunity to grow professionally and socially and to become familiar with all departments on the university campus. Through recognition ceremonies provided by the center and the MSEN Precollege Program, these students are an added highlight for the accomplishments of Fayetteville State University in its community outreach efforts, and they are also a highlight for the Mathematics/Science Education Center. Interacting with academic, business, industrial, community, and political leaders established an arena of networking that will serve to strengthen these students' chances for survival and success.

All continuing USAR students will be participating in summer experiences. Melvin Echols, a graduate from Fayetteville State will be participating in the MED Program and the University of North Carolina at Chapel Hill. The summer research opportunities were determined by mentors and students to ensure that each student would be involved in a project that is geared to enhance their abilities and meet the guidelines of the NASA USAR program.

Problem Areas, Recommended Solutions, and the Identification of Dropouts

The Mathematics/Science Education Center will continue to ensure that each student's progress is closely monitored, assistance is obtained at the critical points, each student selects and enrolls in courses that are aligned with their major of study, faculty mentors establish a close relationship with students, and a center staff member works closely with each individual student.

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Florida A&M University
Increasing Minority Access to Graduate Engineering (Program IMAGE)

Overview

Since the 1988–89 school year, Florida A&M University has conducted Program IMAGE, which aims to increase the number of minorities completing graduate degrees in engineering. Funded by NASA, financial and academic support is provided for participants through their undergraduate years of study, and, upon graduation, they are offered assistance in pursuing graduate study and employment.

Qualification for participation included a minimal high school grade point average of 3.5, an ACT score of 27 or SAT score of 1,250, and interest in pursuing a graduate degree, preferably a Ph.D. in engineering. Students must complete a minimal of 30 hours of coursework each academic year, maintain a cumulative grade point average of 3.0, and, if offered, accept an internship at a NASA facility. The students have the option of pursuing a degree in chemical, civil, electrical, industrial, or mechanical engineering.

Enrollment Data

Since 1988, there have been 229 participants in Program IMAGE. For the 1997–98 school year, there were 114 students (52 females and 62 males) in the project. Seventy-eight of these were returning students, with 36 new freshmen added. Primarily composed of African Americans, two of the participants were of other ethnic backgrounds. The participants were from 21 different States, Washington D.C., the American Antilles, and the Virgin Islands. Participants by entry classes and sex were as follows:

Entry Class	Males	Females	No. of Participants
1993–94	5	11	16
1994–95	17	11	28
1995–96	13	11	24
1996–97	4	6	10
1997–98	23	13	36
Totals	**62**	**52**	**114**

The 1993–94 entry class is the last group to have enrolled when engineering consisted of 5 years of study for graduation.

Florida A&M University
Increasing Minority Access to
Graduate Engineering (Program IMAGE)

Outcomes

The cumulative grade point average earned by each entry class for the 1997–98 school year was as follows:

Class	No of Scholars*	Cumulative GPA
1997–98	34	3.28
1996–97	10	3.51
1995–96	24	3.18
1994–95	28	3.25
1993–94	16	3.19
Totals	**112**	**3.24**

* Two students transferred to other programs.

Twelve students earned a perfect 4.00 grade point average in the fall and spring semesters. Eleven students failed to maintain the required cumulative 3.00 grade point average and were dropped from the program. The entry classes of these 11 students were: 1997–98—4 students; 1995–96—4 students; and 1994–95—3 students.

Four students are being dropped from the program after having exhausted their eligibility for financial support beyond 5 years. These students remain in school and are approaching graduation. Thirty-one students failed to earn a 3.0 grade point average for the spring semester but retain a cumulative grade point average of 3.0 or above.

Program CARE, the academic support component of the project, was operational, with tutors available to render academic assistance and a computer lab available for student use.

Eighteen students graduated in the 1997–98 school year—4 at the end of the fall semester and 14 at the end of the spring semester. Fifteen of these scholars graduated with honors, ranging from cum laude to magna cum laude. Five of these students plan to attend graduate school. One student has elected to stay at Florida A&M for another year to complete required courses for a minor in business. At the time of inquiry, one student was undecided, and the remainder planned to enter the job market. Nine of these had received job offers.

Forty-eight students were selected for summer internships at NASA sites. This represents approximately 42 percent of the 112 participants. For health reasons, one student was not able to do an internship, resulting in 47 students on internship. There is concern with the availability of internship slots as the number of participants increases. The sites and number of selected students were as follows:

Undergraduate Scholars

NASA Site	Number of Students
Ames Research Center	3
Goddard Space Flight Center	5
Jet Propulsion Laboratory	7
Johnson Space Center	5
Kennedy Space Center	10
Langley Research Center	6
Marshall Space Flight Center	9
Stennis Space Center	3
Total	**47**

The 10-week internship period began on May 29, 1998, except for Kennedy Space Center, which began on June 5, 1998. All the students were provided a stipend to assist with travel and initial housing expenses. A biweekly stipend was also provided, except for students at the Jet Propulsion Laboratory, who are provided stipends by that center.

During this school year, 25 scholars attended an Honors Retreat held in Destin, Florida, and these and several more attended and were recognized at the Honor's Convocation held on campus. Twenty scholars attended FOCUS 98 at Georgia Tech in Atlanta. Several students are pursuing the possibility of attending graduate school there. A basketball team was established and participated in intramural sports. Scholars ran for the positions of Miss Florida A&M University, Junior Attendant to Miss Florida A&M, and President of the Student Government Association. A NASA scholar was elected President of the National Society of Black Engineers for 1998–99. NASA scholars also participated in the university's homecoming parade. One student has been awarded a GEM Fellowship for graduate study.

With impetus from a need to construct a new student union center and parking garage, Program IMAGE was moved to a larger and more efficient modular facility. Sufficient space is available to hold scholars meetings, which alleviates the problem of trying to locate other space on campus. As the program grows, it will now be better accommodated. A special advantage is a large outdoors green area in the rear of the building that is ideal for outside activities.

Two professional/enrichment activities were held: a seminar presented by Ron Davis, Electrical Engineer and Sales Director, Perot Systems Corporation, Dallas, Texas (father of one of the freshman NASA scholars) and a résumé writing and effective communication workshop conducted by Bill James of TRW in Los Angeles.

After three planning attempts, scholars finally attended a space launch for educational enhancement. This was a most successful venture and generated much interest among the scholars. Program IMAGE scholars attended the *Atlantis* (*Mir* hookup) space launch held at Kennedy Space Center and toured Universal Studios on September 25–26.

Florida A&M University
Increasing Minority Access to
Graduate Engineering (Program IMAGE)

Undergraduate Scholars

Florida A&M University
Increasing Minority Access to
Graduate Engineering (Program IMAGE)

Partnerships

Program IMAGE enjoys a close working relationship with the Florida A&M Graduate Feeders Program, which has a cooperative relationship with 32 universities to place Florida A&M graduates in graduate schools. The program also works closely with the university's Honors Program, which seeks to stimulate students to maintain high scholarship. Since the inception of the 75/50 support criteria for NASA scholars, based on Pell eligibility, the university has assumed a greater share of the financial obligation for the support of scholars.

Issues

Issues regarding Program IMAGE remain essentially the same as last year. First, the continuing increase in the cost of attendance without a corresponding increase in NASA funding limits the number of students that can be served. Enactment of the 50/75 support criteria, based on Pell eligibility, has begun to affect the kind of student that will be attracted to the program. With a large number of students from out of State, the reduction in financial support inhibits the university's ability to attract the most capable students. Finally, the timing in funding continues to place the university in a deficit funding posture. Although an attempt was made to correct this deficit with a 15-month grant that extends to March 1999, this problem still exists. The number of students to be served will have to be carefully monitored in view of this situation, as well as the others noted.

Howard University
CSTEA HBCU Academic and Research Consortium (CHARC)

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Overview

The Center for the Study of Terrestrial and Extraterrestrial Atmospheres (CSTEA) at Howard University, in conjunction with the Laboratory for Atmospheres at NASA's Goddard Space Flight Center, submitted a proposal on April 15, 1997, to initiate a partnership for education and research. This partnership, known as the CSTEA HBCU Academic and Research Consortium (CHARC), consists of Howard University and the following five HBCU's: Grambling State University, Jackson State University, Lincoln University, Savannah State University, and Virginia State University. NASA funded the project on May 22, 1997.

The primary goals of CHARC are to increase the number of African Americans earning advanced degrees in atmospheric and physical sciences, increase the number participating in research strategic to NASA's mission, and produce college graduates with a strong preparation in the basic sciences, which is necessary for solving future interdisciplinary research problems.

Accomplishments

The Colorado High Plains Study is a new collaborative venture led by CSTEA; its main purpose is to characterize surface fluxes of trace gases and aerosols from agricultural fields as a function of crop type, fertilization patterns, meteorological conditions, and soil type. The ultimate goal is to determine the impacts of agricultural practices on regional tropospheric chemistry and to quantify exchange fluxes of key species, which may affect the ozone balance in the nonurban, continental boundary layer. This effort began in June 1998 with the establishment of the field sites and measurement protocols and was conducted by a group of 10 persons: six CHARC students, a faculty member from Virginia State University, and three students from Howard University.

This group constructed the site, prepared the instrumentation, and took an enormous amount of data. The project was the first of its kind in terms of the magnitude of the undertaking and length of time of the measurement. Data were taken for approximately 1 month. Trace gases, soil parameters, runoff water quality, rate of growth of corn, meteorological data, and aerosol measurements were made at a cornfield near Weldona, Colorado. The data are currently being analyzed.

Howard University
CSTEA HBCU Academic and Research Consortium (CHARC)

Relevance to NASA Strategic Enterprises

The information will aid in refining the data base for remote sensing from satellites by NASA.

Benefits to Society

Society will benefit by the knowledge of the contributions of trace gases to the atmosphere by natural processes. The percentage of atmospheric gases emitted by natural causes as opposed to those coming from human activities is currently unknown. In particular, the project is looking at the gases and aerosols peculiar to the farming enterprise. It is essential that the most accurate data base possible be established for the benefit of the environment. This project represented a beginning of the establishment of a series of truth sites throughout the nation.

Student Achievements

There have been several student achievements during this period, including (but not limited to):

- LaSpace, the Louisiana Space Grant Consortium, has awarded LaQuieta Huey, a physics major at Grambling State University, one of six scholarships.
- Latrice Maxie, a graduate of Jackson State University, presented her paper at the 12th National Conference for Undergraduate Research (NCUR) in Salisbury, Maryland, in April 1998.
- Papers from Monesa Watts and Robin Bridges, meteorology majors at Jackson State University, have been accepted for presentation at the upcoming National Weather Association conference.
- Bobby Wilson, formerly a chemical engineering major at Savannah State University (transferred to Howard University in the fall of 1998), presented his paper at the Georgia Academy of Science Conference.
- Toni Piper, a physics major at Virginia State University, was first-place winner of the 1997 NTA Student Symposium.

Undergraduate Scholars

Howard University
CSTEA HBCU Academic and Research Consortium (CHARC)

Enrollment Data

There were approximately 52 students enrolled in the program during this period: 12 males and 40 females who are all African American. Eleven students graduated during this period. Nine of the graduates are continuing their education as follows:

- Latoia Davis of Grambling State University is continuing at the University of North Texas.
- Alyssia Ogunyemi of Grambling State is continuing at Howard University.
- Jaimal Williamson of Grambling State is continuing at Georgia Tech.
- Eboini Cannon of Jackson State University is continuing at Mississippi State University.
- Latrice Maxie of Jackson State is continuing at Howard.
- Cory Taylor of Lincoln University is continuing at Howard.
- Karen Garvin of Savannah State University is continuing at Howard.
- Brian Gordon of Savannah State is continuing at Howard.
- Talvas Lucas of Virginia State University is continuing at Virginia State.

Outcomes

Even though CHARC just began in June 1997, it is already well on track in attaining one of its primary goals, which is to increase the number of African Americans earning advanced degrees in atmospheric and physical sciences. So far, 11 CHARC students have graduated. Nine of the graduates are continuing their education, with eight continuing in the atmospheric and/or physical sciences. Five of the graduates are continuing their education at Howard University. It is still too early in the program to have any students who have actually earned their advanced degrees.

Partnerships

Each of the five partner HBCU's recruit students into the program, and each may have up to 10 students enrolled in the program at one time. Each partner HBCU assigns its students to mentors, who will collaborate with Howard University and Goddard Space Flight Center to ensure that the students are working on NASA-related research projects. The Principle Investigators and mentors guide the students to ensure that they follow a standard curriculum, which emphasizes the basic physical sciences and mathematics.

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Lincoln University
Lincoln Advanced Science and Engineering (LASER) Program

Overview

Funded by NASA, the Office of Naval Research, and other sources, LASER employs a comprehensive plan to increase the number of minority students seeking a Ph.D. degree in science, engineering, and mathematics. The program provides scientifically talented minority students with a well-structured curriculum and supportive environment through its Summer Bridge and Academic Year Programs.

Objectives

The LASER Summer Bridge Program offers a well-structured curriculum and a supportive environment to help students make a smoother transition to college. Minority professionals provide the students with textbooks, academic support, counseling services, parent and mentor support groups, field trips, and guest seminars. Students can earn up to 20 college science, engineering, and mathematics credits during the summers. Successful students in the Summer Bridge Program receive merit-based scholarships in their freshman and sophomore years at Lincoln University.

The Academic Year Program has activities similar to those of the Summer Bridge Program. LASER students are required to participate in off-campus research experiences to remain eligible for scholarships. After the sophomore year, a select number of outstanding students may apply for LASER fellowships in their junior and senior years. LASER fellows are required to participate in on-campus research activities, especially programs and graduate school enrichment activities.

The overall goal of the LASER Program is to increase the number of minority students that may successfully compete for admission into graduate programs in science, engineering, and mathematics. The program objectives are to:

- Identify and recruit capable students with an interest in science, engineering, and mathematics
- Operate a Summer Bridge Program that develops the skills needed to succeed in college
- Provide research experiences for LASER scholars at Lincoln University, NASA Centers, and other sites
- Strengthen the Departments of Chemistry, Physics, Mathematics, and Computer Science

Undergraduate Scholars

- Strengthen research training programs in the physical sciences
- Provide students with information on career opportunities at NASA and in other science fields
- Increase the number of well-prepared students who can compete successfully for entry into graduate programs leading to the Ph.D. degree

Outcomes to Date

The LASER Summer Bridge Program has made a tremendous impact on the quantity as well as the quality of science, engineering, and mathematics majors at Lincoln. The primary vehicle for chemistry and physics at Lincoln is the Summer Bridge Program, which furnishes at least 70 percent of the chemistry and physics majors. About 90 percent of the students in the Bridge Program enter a science, engineering, and mathematics undergraduate major, and about 70 percent receive an undergraduate degree in a science, engineering, and mathematics discipline.

Twenty-five students participated in the 1997 Summer Bridge Program; of these, 21 returned to Lincoln University for the 1997–98 academic year. Approximately 50 percent currently maintain a cumulative grade point average of 3.0 and above, with an average grade point average of 3.38. Twenty-three students participated in the 1998 Summer Bridge Program; all but one returned for the academic year. Ten students ended the LASER Summer Bridge Program with a grade point average of 3.00 or greater. The LASER Program had the following accomplishments:

- LASER students represented 15 percent of the Deans List for the 1997 academic year.
- More than 60 percent of Lincoln's bachelor's degrees in the physical sciences in 1998 were awarded to LASER Program participants.
- Seven LASER students are members of the Lincoln University Honors Program.
- More than 70 awards/scholarships and prizes were awarded to LASER Program participants at Lincoln's 1997–98 Student Honors Convocation.
- LASER students hold office and are well represented in national honor societies.
- Thirty-nine LASER Program students received stipends based on merit and academic standing with an overall cumulative average grade point average of 3.37 during the fall semester of 1998.
- Off-campus research in 1998 occurred within several disciplines and industries, such as NASA's Goddard Space Flight Center, NASA Space Grant, the NASA Academy, the Federal Aviation Administration, the U.S. Department of Agriculture, the U.S. Food and Drug Administration, Fox-Chase Cancer Center, MIT Summer Internships, and the Hershey Medical Center.

Lincoln University
Lincoln Advanced Science and Engineering (LASER) Program

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Morehouse College
Project SPACE: Strategic Preparedness Advancing Careers in Engineering/ Sciences Program

Overview

Project SPACE is a scholarship program made possible with a grant from NASA. The primary goal of the program is to give high-achieving students an opportunity to pursue undergraduate studies in engineering, mathematics, and the physical sciences. Students selected for the program will receive scholarship awards to cover the partial cost of their undergraduate education.

Target Audience

The students targeted are disadvantaged, and there is an emphasis on African-American prefreshmen. The courses targeted are analysis or precalculus, chemistry, computer science, English, overview to engineering, physics, and reading and vocabulary development.

The selection criteria are as follows: entering freshman at Morehouse College, with an overall grade point average of 3.00 or above, a minimum score of 1,000 on the SAT or comparable ACT, select engineering, mathematics, and/or the physical sciences as a degree objective, and the demonstration of an interest in pursuing an advanced degree in engineering or sciences. The Admissions Office provides a listing of all accepted students meeting Project SPACE program requirements. The participants are recruited from the Morehouse College incoming freshman class.

Enrollment Data

The fiscal year enrollment was 90 African-American males.

Major Strategies

NASA partners include the following NASA installations: Ames Research Center, Langley Research Center, Goddard Space Flight Center, Johnson Space Center, Kennedy Space Center, Lewis Research Center (now called Glenn Research Center at Lewis Field), Marshall Space Flight Center, Stennis Space Center, and the Jet Propulsion Laboratory. Equal opportunity officers work with the program to coordinate 10-week summer internship assignments for Ronald E. McNair Scholars. The project provides

students with a network of support services designed to motivate them to continue studies in engineering, mathematics, and the sciences.

Outcomes to Date

Several students enrolled in the program have graduated and are currently enrolled in graduate school. The tracking is done by name, ethnicity, grades, career choice, college major, and highest academic level completed.

Project SPACE has learned that offering students an opportunity to participate in precollege programs increases their chance for success in college. Bridge programs familiarize students with the campus environment and ease the transition from high school to college. Program support services motivate and encourage students to continue to pursue careers in the sciences, engineering, and mathematics. The summer internship experience provides scholars with work and research experiences in science and engineering environments.

The success of the program can be attributed to the critical program components that serve to enhance the scholar's academic experience. The components are designed to ease their transition from high school to college, motivate them to attend graduate school, and provide them with a forum that encourages them to strive for excellence. Overall, the program has been successful in retaining students and motivating them toward graduate school. Program statistics indicate that with each graduating class, more than half of the students will enroll in a graduate school program.

Morehouse College
Project SPACE: Strategic Preparedness
Advancing Careers in Engineering/Sciences Program

The students of Morehouse College's Project SPACE.

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Morgan State University Undergraduate Scholars Awards for Research (USAR) Program

Overview

The Undergraduate Scholars Awards for Research (USAR) Program is being conducted at Morgan State University in conjunction with NASA to develop a pool of talented, historically underrepresented scientist and engineers in fields related to NASA's mission.

Enrollment Data

During the 1997-98 academic year (September 1997–August 1998), 10 engineering students were participants in the NASA USAR Program at Morgan State University. The following lists the names, race, gender, academic major, classification, and overall grade point average of the ten participants:

Name	Race/Gender	Major	Class	Grade Point Average
Eugene Alexander	Black male	Electrical engineering	Senior	3.104
Jamaal Bandele	Black male	Electrical engineering	Junior	3.000
Jason Demory	Black male	Electrical engineering	Junior	3.397
Levar Fraiser	Black male	Electrical engineering	Soph.	3.484
Sonia Gay	Black female	Electrical engineering	Junior	3.885
Sean Johnson	Black male	Electrical engineering	Senior	3.355
Yolanda Langhorne	Black female	Chemical engineering	Senior	3.174
Isaac Mason	Black male	Chemical engineering	Junior	3.321
Tova Scott	Black female	Chemical engineering	Junior	3.686
Shari Watson	Black female	Electrical engineering	Junior	3.735

Outcomes

There were three seniors among the participants during the reporting period (September 1997–August 1998). Two of the seniors graduated in May 1998 (Eugene Alexander and Yolanda Langhorne), and the third senior (Sean Johnson) is scheduled to complete his graduation requirements in December 1998. Yolanda Langhorne has been admitted into the Ph.D. program in Environmental Studies at Carnegie-Mellon University in Pittsburgh, Pennsylvania. Eugene Alexander has accepted a position with Bell Atlantic Corporation. He plans to pursue graduate training on a part-time basis at Johns Hopkins University.

The eight nongraduating students all participated in summer internships. Three of the students interned at NASA's Goddard Space Flight Center, one of the students interned for a local office of a Federal Government agency, one student had a research position with a faculty member at Morgan State University, and three students interned with local aerospace-related corporations.

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NAFEO Services, Inc.
Student Researchers Consortium

Overview

The NASA-sponsored Student Researchers Consortium is coordinated by NAFEO Services, Inc., a nonprofit educational organization. The major objectives are to identify, from a universe of financially needy students, a targeted number who have high potential for conducting research in areas relevant to NASA's mission, to identify mentors who will give support and guidance to the student researchers, to create a consortium so that the researchers would have an opportunity to interact among their peers from other institutions, to provide a research experience for the students, and to initiate the actual performance of research by the students.

Accomplishments

NAFEO Services has been successful in coordinating the consortium and accomplishing the objectives of the project. It has worked in close cooperation with administrators from 17 HBCU's in creating a supportive environment for a critical mass of student researchers that fosters interaction among them. Faculty members from the 17 institutions were selected by the presidents of these institutions to serve as mentors to the student researchers. The students met with their mentors regularly in formal and informal sessions through the academic period.

Personnel from NAFEO Services interacted with the 57 student researchers through postal and electronic mail, telephone, and personal contact at workshops and conferences. A workshop was held in Houston, Texas, for the student researchers and provided the opportunity for students to present their preliminary research findings, to discuss research outcomes with their peers, and to use state-of-the-art technology to access NASA's online electronic resources. The students also attended the NASA University Research Centers Technical Conference on Aeronautics, Space Science and Technology, Earth Systems Global Hydrology and Education in Huntsville, Alabama. The workshop focused on increasing the numbers of advanced degrees in NASA-related fields awarded to minority students. This also was an opportunity for the scholars to interact with other NASA students who were in attendance.

Undergraduate Scholars

NAFEO Services, Inc.
Student Researchers Consortium

Scholarships were processed for all students in consultation with their mentors. Student researchers were placed in summer research experiences at NASA facilities and other research institutions throughout the nation.

Relevance to NASA Strategic Enterprises

The consortium scholars' disciplines complement the needs of NASA's four Strategic Enterprises. A very important component of this program is to ensure that the scholars are given preparation for obtaining leadership roles in the fields of science and technology and to develop groundbreaking research relevant to the solar system and the currently known and unknown infinity of the universe. The Consortium scholars' disciplines include the physical sciences, engineering, computer science, and mathematics. They are being developed to be "cross-functional" within NASA according to mission requirements.

Benefits to Society

The consortium aims to increase the participation of underrepresented groups in the various programs sponsored by NASA. NAFEO Services has redirected 57 students whose financial need may have impeded their academic progress and restrained them from being catapulted into career paths parallel to the career opportunities provided by NASA. Their success will inevitably produce contributions to society rather than burdens on our nation's resources. It also will produce individuals who, as researchers, may expand our scientific knowledge of Earth and space.

Student Achievements

The consortium has received exceptional recognition for its talented and innovative scholars. Its scholars engaged in cutting-edge research in areas of vital importance to society, such as medicine, physics, the environment, aviation, engineering computer operations and security, information/data transfer, industrial processing, and agrobiology. The following are some specific examples of the achievements the students have made initiating and developing research projects:

- Some researchers have been performing biomedical research that might be used to benefit individuals physically involved in outer-space research through highly complicated microbial and genetic experimentation.
- A researcher assisted with creating solutions to solve problems involving network fraud detection, for various securities operations, conducted at Los Alamos National Laboratory. The researcher helped present the results to the Federal Securities Administration in Santa Fe, New Mexico.

Undergraduate Scholars

NAFEO Services, Inc.
Student Researchers Consortium

- A researcher aided the Shuttle Radar Topography Mission (SRTM) at Kennedy Space Center, which will collect data to generate three-dimensional pictures that scientists will use for studies of ecological disasters and climate changes. The completed project allows customers to link scientists and data during analysis.
- Another researcher was involved in the development of Web pages and Web-based survey instruments to improve operations at NASA's Marshall Space Flight Center. Various intricate programming languages, including Virtual Reality Modeling Language (VRML), were used. The project is ongoing, with the goal of VRML Web pages for the entire Marshall operations.

The consortium has developed a sterling reputation for its pioneering critical mass concept and achievements. Its scholars have proven research skills. They welcome research opportunities with NASA and other leading institutions.

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National Consortium for Graduate Degrees for Minorities in Engineering, Inc.

Overview

The NASA Education Grant to the National Consortium for Graduate Degrees for Minorities in Engineering and Science, Inc. (GEM), provides selected NASA undergraduate scholars with fellowships for their master of science degrees. Also included are NASA 10-week-long summer research experiences and mentoring to enhance their competitiveness for the NASA Graduate Student Research Program (GSRP), leading to a Ph.D. in key disciplines.

Enrollment Data

Nine of the NASA Centers have participated in technical training of master of science and Ph.D. students. A total of 27 have participated in the 10-week-long Summer Internship Program at different NASA sites throughout the country. Selected students are senior-level undergraduates and NASA scholars who are pursuing graduate degrees in engineering.

All Fellows who are selected are based on recommendations by the NASA interning site, and only after they have expressed research interests compatible with the participating NASA Center. The total amount of Fellows that GEM has supported in the program is 27. From this total, there are 22 master of science (engineering) Fellows, one Ph.D. in engineering, and four Ph.D.'s in science.

Achievements

The NASA Summer Internship Program (1998), which lasted for 10 weeks at the different NASA research sites, provided students with hands-on experience on research and development in engineering and the sciences. Students were provided with a NASA mentor and an enriching research experience at the specific NASA Center where they participated. The majority of students that were selected started their master of science or Ph.D. programs during the 1997–98 academic year.

Undergraduate Scholars

National Consortium for Graduate Degrees for Minorities in Engineering, Inc.

Outcomes

Specific outcomes of the NASA program focus on retention strategies of students in their respective graduate programs. Also, students should be made aware of the increased competitiveness of the NASA Graduate Student Research Program (GSRP).

GEM's Summer Institute held in Ft. Lauderdale, Florida, during July 1998 brought out the salient endeavors of NASA students and detailed a comprehensive overview of the NASA program. Why Graduate School: Processes and Implementation (WGSPI) and the mentoring workshops addressed some of the problems for which students must prepare when entering graduate school.

Twenty-seven students were awarded fellowships in 1997–98. Sixteen of the selected students were female (59 percent) and 11 were male (41 percent). Twenty-one of the selected students were African American (78 percent) and five were Hispanic (19 percent). All of the students selected had grade point averages of 3.0 and above.

Partnerships

The GEM Consortium is linked with 83 universities and 66 member corporations, which provide a lasting and strong bond for Fellows, who are receiving financial support for advanced degrees. This partnership is what supports the NASA GEM Fellows through the graduate school experience. This is further enhanced by the partnership between the NASA mentor and the NASA GEM Fellow. This denotes a foursome partnership, which strengthens the educational experience, with the graduate Fellow as the beneficiary. As the Fellows continue through their graduate school education, they will receive further preparation through their NASA mentors, 10-week summer internships, and the WGSPI program to enhance their competitiveness in the NASA GSRP and their graduate degrees.

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New Mexico Highlands University Undergraduate Scholars Awards for Research (USAR) Program

Overview

New Mexico Highlands University has been participating in this program since January 1992. The program has been able to attract and retain quality minority students in mathematics, science, and engineering. Many of these students are bound for rewarding NASA careers. The university, with NASA support in 1992, started a bachelor of science in engineering program. This is a general engineering program and supplanted the previous engineering technology program. The problem former graduates faced was that the engineering technology degree precluded, by regulation, the possibility of employment with NASA.

Enrollment Data

To date, 10 students have participated in the USAR program at New Mexico Highlands University. Of these, two transferred to other New Mexico universities because of their interest in branches of engineering not offered at New Mexico Highlands. Another student transferred to a prestigious liberal arts college in the East, and a total of three students have graduated from our bachelor of science in engineering program. There have been no dropouts.

Outcomes

One graduate is now pursuing a graduate degree in electrical engineering. Another is working for a degree in medicine. A third graduate decided to begin a career in teaching after graduating with honors and working for a year in the electronics/optics industry.

USAR participants have been involved in NASA-funded research projects on the New Mexico Highlands University campus and have engaged in summer internships at NASA's Dryden Flight Research Center. One student has decided to make a career of aviation and has successfully completed a cooperative education program with the Federal Aviation Administration.

Issues/Concerns

The primary difficulty the students face stems from poor preparation in mathematics and physics at the high school level. It is typical that some students must repeat a beginning course, after which they perform very well.

Undergraduate Scholars

New Mexico State University Undergraduate Scholars Awards for Research (USAR) Program

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Overview

The USAR grant program at New Mexico State University aims to fund undergraduate scholars in science, mathematics, engineering, or computer science. It is designed to increase the number of underrepresented minorities and persons with disabilities pursuing undergraduate degrees in space science, aerospace technology, and their related fields and, subsequently, to increase the number of minority students entering graduate school.

Enrollment Data

There are nine participants in the program, of which eight are males and one is female. Also, eight of the participants are Hispanic, while one is Asian.

Outcomes

Gregory Chavez was a senior at New Mexico State University, majoring in civil engineering. He spent his spring and summer semesters studying in Buenos Aires, Argentina. Because of his participation in the Study Abroad Program, his classes continued through early summer.

Eli Gonzales was a freshman at New Mexico State University, majoring in electrical and computer engineering at the end of May 1998. He presented the research results from his summer research on October 29, 1998, in a colloquium held at the university for all undergraduate and graduate NASA scholars. Eli spent the summer in Raton, New Mexico, working with the Raton Public Schools. He worked on the school district networking system under the supervision of Superintendent Butch McGowen. He worked 40 hours per week for 8 weeks, starting May 26 until July 20, 1998.

Mylena Holguin was a senior at New Mexico State University, majoring in chemical engineering. She worked with Dr. Jeffery Aterburn of the Chemistry Department at the university during the summer. Her research project was “Rhenium Radiopharmaceuticals for the Selective Imaging and Therapy of Breast Cancer.” Mylena planned on graduating in May 1999.

Undergraduate Scholars

New Mexico State University Undergraduate Scholars Awards for Research (USAR) Program

Sanjeev Nirmalakhandan was a freshman at New Mexico State University at the end May 1998, majoring in computer science. He presented the research results from his summer research at the October 29, 1998, colloquium. He spent part of the summer attending school at New Mexico State University and the second part of summer working at the Civil, Agricultural, and Geological Engineering Department at the university. Sanjeev developed computer-based presentations and interactive simulation programs by using HyperCard, MathCad, and Web CTronmental Sciences Divisions for use in graduate courses.

Manuel Rios was a junior at New Mexico State University and informed Dr. Hynes the he would attend a non-USAR university in the fall of 1998. He has been unable to maintain is eligibility in the USAR program.

Eric Rodriguez was a junior at New Mexico State University at the end of May 1998, majoring in civil engineering. He presented the research results from his summer research at the October 29, 1998, colloquium. He spent his summer at Marshall Space Flight Center, working under Marc Verhage in ED 72 in the Structures and Dynamics lab in the Structural Test Division.

Randall Rodriguez graduated in December 1997 with a bachelor of science degree in electrical and computer engineering. He is working at Intel Corporation in Albuquerque, New Mexico.

Isaac Salazar was a sophomore at New Mexico State University at the end of May 1998, majoring in mechanical engineering. He presented the research results from his summer research at the October 29, 1998, colloquium. He worked at Los Alamos National Laboratory in the Engineering and Science Division, working on a project in vibrational analysis as well as doing research in structural mechanics and materials behavior. His supervisor was Chuck Farrar.

Francisco Vigil graduated in December 1997 with a bachelor of science degree in electrical and computer engineering.

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NASA Cooperative Agreement NCCS-116

Overview

The Network Resources and Training Site (NRTS) based at South Carolina State University has completed an exceptional period of growth and implementation in Year 3 of its MU-SPIN/NASA funded Institutional Research Award. Also known as the Center for Network Resources and Training (CNRT), this consortium includes the lead institution and 11 partners in the States of Georgia, Florida, and South Carolina, nine HBCU/Minority Institutions, and three K-12 schools. The mission of the consortium is to provide infrastructure, technical support, and training in the use of the Internet and related technology in support of educational and research programs at the partner schools. Some services are provided to the schools and the community at large, but CNRT places special emphasis on the technical fields of mathematics, science, engineering, and technology.

Goals for Year 3 included:

- Setting up a training lab at each site large enough to manage an entire class
- Installing a server with local control over Web pages and other services
- Increasing collaboration among the partners and other MU-SPIN NRTS's

Goal 1 was achieved at all but one school. Goal 2 was achieved at all but one school by November 1998. Goal 3 has been achieved both within the partnership and in collaboration with the other NRTS's.

South Carolina State University NRTS engineering major, Andre Green, learned network management skills under MU-SPIN NRTS funding and was able to find employment in the information technology field after graduation.

Outcomes

Training

The impact of the MU-SPIN grant on training and related activities in Year 3 cannot be overstated. The 12 member schools conducted 762 workshops and other activities with an attendance of 10,092. Some of this fourfold increase in attendance compared to Year 2 (see chart) was partly because of more complete reporting, but a large part of it was because the MU-SPIN–funded infrastructure was in place the entire year and the schools took full advantage of it.

Undergraduate Scholars

South Carolina State University
Network Resources and Training Site

Graduate students and faculty at the South Carolina State NRTS workshop held at Florida International University discuss supercomputing research.

Education

The MU-SPIN/NASA infrastructure had an impact on the educational capabilities of every member of the consortium in ways that were not possible prior to the implementation of this program. Claflin students in biology, Earth science, and computer science regularly use the Web to research assignments and term papers. At Allen University and Edward Waters College, MU-SPIN provides the only high-speed access to the World Wide Web on campus. Morris College faculty members use their facilities in college level physics and environmental science courses. Likewise, at Morris Brown, the sciences have benefited tremendously from the Web access, and instructors routinely assign work that requires students to search the Web for resources. Benedict College trains all its faculty members and most of its students using the NASA-funded infrastructure.

At South Carolina State, a sophomore physics class is using the NRTS servers to interactively list and answer questions from students to each other and to the instructor. CNRT also funded the development of a calculus course at the university, which will use mathematics to improve student mathematical concepts and problem solving. The K–12 partners use the Web for a wide range of courses, including physics, calculus, biology, and Earth science.

Research

All member schools that engaged in research report heavy use by their faculty members to support their research. E-mail exchanges with colleagues, listserv updates (such as NASA's Office of Space Science Research Announcements), and Web-based resources are routinely used today thanks to the MU-SPIN project. A materials science lab at South Carolina State University was funded with $400,000 from the Department of Defense, including a $150,000 superconducting NMR unit, which must be managed by a UNIX workstation. At South Carolina State, only the MU-SPIN–funded CNRT was able to provide the UNIX support necessary to operate its lab. Environmental Science at South Carolina State includes the only field station in the country devoted to undergraduate research. A consortium of more than 20 institutions is part of this program, and funding for faculty release time and Web supports is provided by CNRT. More details can be found at *www.cnrt.scsu.edu/sets/programs/fieldstation*.

Excellent examples of technology transfer exist within the consortium. Florida International uses its MU-SPIN–funded SGI supercomputer for environmental and material science projects (*www.hcet.fiu.edu*), including a project for a commercial company. Voorhees used its MU-SPIN and other NASA infrastructure to leverage additional funds and projects, including $110,000 to

lead a consortium of 10 UNCF schools in establishing a GIS technology data clearing center, $400,000 from the Department of Housing and Urban Development to revive the local community through information technology, and $60,000 from the Department of Transportation to assist disadvantaged and women-owned businesses.

South Carolina State University Network Resources and Training Site

Outreach

Programs for off-campus groups continue to be an important part of every school in CNRT, including everything from public astronomy observing sessions to Saturday academies. Benedict College devotes its resources to helping at-risk children through access to the World Wide Web at several off-campus sites. Howard Middle School provides a great service to a segment of the community, which is economically disadvantaged through an after-school program, where community members use the MU-SPIN infrastructure to access the Web.

Partnerships

CNRT collaborated with all six of the other NRTS, and they conducted workshops at Elizabeth City State University, sent faculty and staff to the University of Texas at El Paso for multimedia training, and visited Prairie View A&M to examine current videoconferencing technology. In addition, Morgan State and the University of Texas at El Paso conducted lectures on supercomputing at the CNRT Spring 1998 Regional Workshop. Tennessee State University and South Carolina State University maintained existing research collaboration in astrophysics. City College of New York sent two students to South Carolina State University for 8 weeks of astrophysical research in the summer of 1998.

At the NRTS partner school lab at Edward Waters College in Jacksonville, Florida, connectivity was provided by an MU-SPIN-funded Cooperative Agreement with the South Carolina State University NRTS.

A new collaboration was established between CNRT and Howard University, including the submission of joint proposals to NASA. The CNRT consortium developed stronger ties among its members within the organization as well. The K–12 partners (Howard Middle, Bowman High, and OW High) established a successful collaboration among all three through a coordinated implementation of the NASA GLOBE program.

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Southern University and A&M College at Baton Rouge Undergraduate Scholars Awards for Research (USAR) Program

Overview

The NASA USAR project at Southern University and A&M College at Baton Rouge (SUBR) has been a phenomenal success. The retention rate of the students is 100 percent. The USAR scholars have all remained on course in their respective disciplines. Out of the seven USAR scholars supported for matriculation at SUBR, two of them have graduated. Jeremiah Grey and Anthony Stewart will complete their degree requirements in the spring of 1999.

Enrollment Data

The ethnicity of the five USAR scholars is African American, and they are all from the East Baton Rouge Parish school district. Sareneé L. Cooper is currently a junior physics (biophysics) major. Jeremiah Grey is currently a senior physics major. Branton Moncriffe is currently a junior physics major. Anthony Stewart is currently a senior physics major. Tracee W. Thomas completed the required course work for a bachelor of science degree in chemistry from SUBR. She is currently completing her course work at Louisiana State University for a dual degree in chemistry/chemical engineering. She was expected to graduate in the spring of 1999.

Outcomes

Support by NASA has resulted in the recruitment and mentoring of high-caliber students. A strong foundation has been laid in the areas of research and innovation; these students were afforded the opportunity to conduct research in first-class laboratories using state-of-the-art equipment. The placements in the laboratories have also resulted in relationships with research mentors who are prime examples of a career in their respective disciplines. Participation in national, local, and State conferences is also attributed to the financial support provided by NASA. The scholars competed for and received awards and recognition for their research accomplishments. The conference participation roster includes the American Physical Society, NAFEO, the National Conference of Black Physics Students, the U.S. Department of Energy/EPSCoR SEM Conference (Tracee Thomas won a second place award in November 1996), the National Conference of

Undergraduate Scholars

Black Physicists, the Julia M. Martin College of Sciences Symposium, and the National Science Foundation's National Diversity Conference.

Partnerships

Partnerships have been established with the various NASA facilities and national laboratories in which the scholars have performed their summer research. The research sites have included NASA's Lewis Research Center (now Glenn Research Center), NASA's Stennis Space Center, Lucent Technologies, Lawrence Livermore National Laboratory, IBM, and Louisiana State University.

Followup/Graduate Enrollment

Robert Smith is currently working at United Space Alliance and will enroll in a graduate program at the University of Houston at Clear Lake in the fall of 1998. Troy Williams recently graduated from the master of science in physics program at SUBR. He was to enter Louisiana State University in the fall of 1998 to pursue a Ph.D. in physics.

Southern University and A&M College at Baton Rouge Undergraduate Scholars Awards for Research (USAR) Program

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Stacey Nichols, a Spelman College USAR senior, presents a poster at MIE/SEM Day.

Spelman College Undergraduate Scholars Awards for Research (USAR) Program

Overview

The Spelman College USAR Program provides academic, research training, and scholarship support for outstanding students in science, mathematics, engineering, and computer science. The goal of USAR is to increase the number of qualified minority women scientists and engineers, particularly those with graduate degrees. The program objectives are to:

- Identify and attract disadvantaged, entering women students to career paths in science, mathematics, and engineering
- Retain students in science, mathematics, and engineering majors until they receive bachelor's degrees
- Prepare students for success in graduate study in scientific and technical areas
- Increase the number of students who pursue graduate degrees and research-related or teaching careers in scientific and technical areas

Enrollment Data

Students are selected for the USAR Program on a competitive basis from the pool of scientifically talented students who have applied for admission to the freshman class of Spelman College and from the pool of outstanding students completing the freshman class. Students are considered if they are seeking majors in the areas of science, mathematics, and engineering that are related to NASA's mission and if they have grade point averages and entrance test scores that reflect high academic achievement and promise. A small number of students meeting the qualifications are invited to apply, as well as any student who makes an inquiry.

There were nine USAR students in the Spelman program during the 1996–97 academic year: two fifth-year and one fourth-year Dual Degree Engineering Program students, one junior who attended Georgia Tech, and one freshman, three sophomores, and one senior who were enrolled at Spelman College.

Accomplishments

Each USAR scholar was assigned a faculty mentor, with returning scholars given the same faculty mentor as the previous year. The scholars and faculty mentors were invited to a joint opening reception /meeting, at which program policies and procedures

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Spelman College
Undergraduate Scholars Awards for Research
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were outlined and student responsibilities discussed. A program was held in the fall for oral and poster presentations of summer research projects. Faculty mentors attended a group meeting to make plans for the year. Scholars met with their faculty mentors at least twice a month for advisement and counseling. In some cases, the faculty mentor served as a research supervisor for the student, and their meetings were merged into the research endeavor. In some cases, because of changing interests of the student, the faculty mentor made arrangements for research supervision by another faculty member.

The USAR senior participated in the Graduate Research Orientation Workshops (GROW) and the GRE review sessions. Students of all classifications were encouraged to attend special science events that were identified by their faculty mentors. Two students attended the NASA URC Conference in Huntsville and participated in the session for undergraduate and high school students. Students were assisted by their faculty mentors and the Office of Science, Engineering and Technical Careers in applying for summer research opportunities.

Three students held summer intern positions at NASA's Ames Research Center, Langley Research Center, and Lewis (now Glenn) Research Center. Other students held summer research positions at Rutgers University, the Georgia Department of Transportation, and the Stanford Linear Accelerator Center.

Spelman College's Monique McCloud explains her first place mathematics research presentation at Science, Engineering and Mathematics Day.

Student Achievements

One student graduated from Spelman College in May with honors and entered graduate school at the University of Maryland to pursue graduate study in mathematics. One student gave poster presentations at the MIE/SEM Day. Three students in the Dual Degree Engineering Program were selected for Outstanding Student Awards at the Dual Degree Awards Banquet.

Partnerships

As partners, Spelman College and Georgia Tech provided faculty mentors for the USAR scholars. Spelman College also provided a program director, and the Office of Science, Engineering and Technical Careers assisted with summer placement and graduate school preparation activities.

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Spelman College
Women in Science and Engineering Scholars Program

Overview

The Women in Science and Engineering (WISE) Scholars Program is an academic and research program in science and engineering that embraces the undergraduate years. The program provides scientifically talented minority and disadvantaged female students with the opportunity to pursue undergraduate studies in science and engineering in the highly motivating and supportive environment of Spelman College. WISE Scholars enroll in Spelman as freshmen and pursue majors such as electrical engineering through the Dual Degree Engineering Program, mathematics, and physics.

The WISE Scholars Program is designed to motivate students to pursue a Ph.D. in science or engineering and to enter careers as scientists, engineers, or teachers. Its goal is to increase the number of highly qualified women in scientific and technical careers. The program objectives are to:

- Identify and recruit capable students with an interest in science or engineering
- Enhance the science and mathematics backgrounds of pre-freshmen students selected for the WISE Scholars Program
- Enrich the undergraduate academic experience for talented students majoring in science and engineering
- Provide research experiences for scholars at Spelman, NASA Centers, and other sites
- Provide students with information on career opportunities and activities at NASA
- Motivate and encourage students to pursue graduate degrees in science and engineering

Enrollment Data

Students begin the WISE Scholars Program as freshmen at Spelman College. They are selected on a competitive basis from talented minority and disadvantaged female high school seniors who are interested in the physical sciences, mathematical sciences, computer science, or engineering, particularly those living close to NASA Centers. Brochures and applications are sent to high schools in the targeted areas. The materials are distributed during college recruitment trips, on high school campus visitation days, and upon request. Applications are also sent to seniors applying to Spelman College who indicate a major in the specified fields and demonstrate scientific talent.

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Accomplishments

Twenty-eight new WISE Scholars were added to the program in the fall of 1997, bringing the total to 77. One student was enrolled at North Carolina A&T State University and 19 at Georgia Tech as Dual Degree Engineering Program students. The remaining 57 students attended Spelman College.

The freshmen attended the Summer Science and Engineering Program prior to entry and an Orientation Conference for students and their families. NASA officers and the Spelman College program staff gave presentations. The 45 Scholars at Spelman were approved for registration in strong sequences leading to majors in mathematics, physics, chemistry, computer science, and engineering.

A weekly seminar was held for the freshmen Scholars with the Director and Co-Director. Presentations of summer research projects at NASA Centers were given during two open sessions in September. Tutorials throughout the year provided assistance in freshmen and sophomore science and mathematics courses. Other activities included a transitional meeting for Dual Degree Engineering Program students, the Graduate Research Orientation Workshops (GROW) for seniors, science lectures, a newsletter, and a recognition activity for graduating seniors. Forty-nine students engaged in summer research for 10 weeks at NASA Centers and the Jet Propulsion Laboratory.

Student Achievements

Thirteen students graduated from Spelman with bachelor of science degrees, and 12 of these also graduated from Georgia Tech with bachelor of engineering degrees. Four students were accepted to graduate schools with scholarships and one to a professional school. Four students were elected to the Pi Mu Epsilon Honorary Mathematics Fraternity, four to Mortar Board, four to the Golden Key Honor Society, and three to the Phi Beta Kappa Honor Society. WISE Scholars were named as the Most Outstanding Fourth-Year Mechanical Engineering Student, Most Outstanding Fourth-Year Chemical Engineering Student, Most Outstanding Chemical Engineering Student, Most Outstanding Material Science Student, Most Outstanding Academic Achievement (nine Scholars), 4.0 G.P.A. Award (five Scholars), and Leadership Student of the Year at the Dual Degree Engineering Program Awards Banquet. Wise Scholars won first place for mathematics poster, physics poster, and engineering oral presentation at the Annual Science Day. Scholars gave poster or oral presentations at the Joint Mathematics Meetings, American Chemical Society, and the National Conference on Undergraduate Research. A fourth-year student was name Presidential Scholar, Material Science Award.

Spelman College
Women in Science and Engineering Scholars
Program

Partners

The only formal partner is Spelman College, which provides many support activities essential for the success of the Scholars through the Student Life Division. A major contribution is the provision of research opportunities during the academic year by professors, who supervise students in undergraduate research and prepare them for campus and external public presentations.

Spelman College
Model Institutions for Excellence

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Overview

Model Institutions for Excellence (MIE) is a comprehensive institutional program whose goal is to increase the number of minorities earning high-quality science, engineering, and mathematics (SEM) baccalaureates and entering scientific and technical professional careers. During the third year of operation, the MIE program served as an umbrella for the improvement of the science education and research program at Spelman College and was successful in enhancing all science departments. The project objectives are to:

- Infuse curriculum revision and innovative teaching methodologies into the SEM program
- Implement early intervention and other student support and enrichment activities
- Strengthen and expand the SEM administrative, research, and computing technology infrastructure
- Increase the number of minority women earning SEM baccalaureate degrees and entering SEM graduate programs and professional careers
- Establish an effective tracking system for monitoring student progress and making appropriate program modifications to increase student success
- Serve as a national resource for other institutions of higher education that seek to enhance their SEM baccalaureate output of minorities and women

Enrollment Data

All Spelman students benefit from the MIE enhancements in the SEM educational program. There were 1,268 student enrollments in SEM courses that had been modified through MIE-sponsored curriculum development. Twenty-three sophomore SEM majors were selected as MIE Research Interns to work in group or individual research projects under the direction of faculty supervisors. Twenty-two additional students were engaged in research Project Focus Teams under the direction of a faculty research supervisor. Twenty students were selected for the Postfreshman Summer Science Program. Forty incoming freshmen participated in the Summer Science and Engineering Program. Students for the summer programs and research opportunities were selected on a competitive basis.

Spelman College
Model Institutions for Excellence

Accomplishments

Five Project Focus Teams consisting of a faculty member and four to eight undergraduate researchers were formed. The teams focused on the following research themes: Bioremediation of Heavy Metals, Biotransformations of Arsanilic Acid and Roxarsone, An Analysis of Air Resistance, Dynamical Systems, and Object-Oriented Implementations and Testing of Algorithms.

Several curriculum enhancements that were made during the previous year were fully implemented, including Web-based materials in general biology; special modules and new teaching methodology in Organic Chemistry, Computer Organization and Design, and Electromagnetic Theory were piloted in the Computer Science and Physics Departments. Two new courses, Overview to Environmental Science and Ecology, were developed.

A Coordinator of Graduate School Relations was hired to enhance existing relations with graduate schools and to develop relations with additional institutions to promote student entry into graduate programs. Cooperative agreements were made with California Institute of Technology, Columbia University, and the University of Florida for the Dual Degree Engineering Program.

The Spelman College Learning Ctt in the SUN Laboratory during the Summer Science and Engineering Program.

Student enrichment and development activities included an enhancement of the Early Warning Program, a training workshop for tutors, an advising workshop for faculty, the development of study skills components for three SEM departments, GRE preparation sessions, Graduate Research Orientation Workshops (GROW), a career and professional conference, the hosting of several scientists and engineers, and MIE SEM Day.

Two mathematics faculty were given release time to engage in individual developmental activities. One explored “wavelets” and is writing a book in this area. He also led a session on wavelets at the annual American Association for the Advancement of Science (AAAS) meeting. The other faculty spent the semester at Georgia Tech in a collaborative relationship to move into the new research area of “dynamical systems.” Workshops on proposal writing and evaluation were conducted for faculty.

The Summer Science and Engineering Program for entering freshmen and the Postfreshman Summer Science Program were held for 6 weeks in the summer. The programs provided intensive instruction in SEM areas and enrichment activities. The participants visited Marshall Space Flight Center, attended a session with women astronauts, and participated in other MURED-sponsored events at the annual meeting of the NAACP, and they were recognized for their achievements at an awards banquet.

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Spelman College
Model Institutions for Excellence

Student Achievements

Fifty-two students gave oral or poster presentations of their undergraduate research projects in the annual MIE SEM Day at Spelman, which was attended by more than 300 students and 12 external judges and presenters. Students gave presentations at the meeting of the Southeastern Section of the Mathematical Association of America, the National Conference on Undergraduate Research (1998), the Georgia Academy of Sciences meeting, and the annual MIE Conference in San Juan. There were 634 students pursuing SEM majors and 116 students who received SEM baccalaureates.

Partners

Spelman College was the major partner, providing a variety of student services, computer service, and resources for program operations. Several corporations, foundations, and government agencies were informal partners, providing scholarships, summer internships, research support, and curriculum development assistance to strengthen the science education and research program. Agencies and organizations, including the National Institutes of Health, the National Science Foundation, NASA, Howard Hughes, Boeing, and the U.S. Department of Energy supported faculty who served as research supervisors. Eleven universities participated as cooperating engineering institutions for the Dual Degree Engineering Program.

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University of Central Florida
NASA Kennedy Space Center/University of Central Florida Scholars Program

Overview

This report covers the period from June 1997 through August 1998. The program is designed to provide personal/professional development and financial support for students pursuing space-related careers. The program admitted a total of 20 students. The last group of five students was admitted to the program in May 1996. During this reporting period, there were 15 students remaining in the program.

In addition to the students receiving a scholarship, they are employed at the Kennedy Space Center during the summer. The students have two mentors, an engineer at Kennedy Space Center and an engineering/science faculty member. Throughout the semester, the students meet with the mentors and program coordinator to discuss their schedule, classes, academic progress, summer placements, and other concerns. The students are encouraged to join and become active in the student chapters of their professional organizations.

Enrollment Data

The 15 students are majoring in engineering, physics, or chemistry. There are six males and nine females of the following ethnic backgrounds: seven African Americans, five Hispanics, one Pacific Islander, and two Caucasians.

Outcomes

Of the 20 scholars selected, five have graduated; three are in graduate school and two are working as engineers. The NASA Kennedy Space Center/University of Central Florida Scholars Program has a 97-percent retention rate. From the freshman through junior years, there was a 100-percent retention rate. The average grade point average of the scholars is 3.2. All students remain in engineering and science.

Partnerships

This program is a model for fostering a relationship between the local College of Engineering and a NASA site.

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University of Maryland at Baltimore County
Meyerhoff Scholarship Program

Overview

Since 1988, the University of Maryland at Baltimore County (UMBC) has undertaken several major initiatives designed to address the problem of poor performance of African-American students in science and engineering. To address this need, the Meyerhoff Scholarship Program was created at UMBC in 1988 with a substantial grant from the Robert and Jane Meyerhoff Foundation. Robert Meyerhoff was particularly interested in addressing the shortage of African-American students, competitively selected from across Maryland, who would major in mathematics, science, engineering, or computer science and then pursue Ph.D.'s in these areas. The first group of Meyerhoff Scholars included 19 young men who enrolled in the fall of 1989.

Now in its 10th year, the Meyerhoff Scholarship Program is open to all high-achieving high school seniors who have an interest in pursuing doctoral study in the sciences or engineering and who are interested in the advancement of minorities in the sciences and related fields. The program has a total enrollment of 205, including 53 new Meyerhoff freshmen in the fall of 1998 (with average SAT scores of 1,301) and 26 students from outside Maryland (California, the District of Columbia, Michigan, New Jersey, New York, North Carolina, Ohio, Pennsylvania, and Virginia).

The Meyerhoff Scholarship Program is based on a strengths model, which assumes that every student selected to participate is capable of succeeding in science and engineering, given appropriate opportunities and resources. The program also provides substantial support for students from their prefreshmen summer through graduation and beyond.

Program Components

The program consists of 12 components, which, together, help create an environment that continually challenges and supports students. In addition, the program's emphasis on involving different kinds of mentors provides various forms of support across a variety of disciplines. The program components are as follows:

- *Recruitment of Top Math and Science Students*—This is a highly competitive process to select science, math, and engineering students and involves faculty, staff, and students.

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- *Summer Bridge Program*—This 6-week summer program for incoming freshmen integrates a strong academic program with a rich cultural and social experience.
- *Scholarship Support*—Meyerhoff Scholars receive a 4-year scholarship; finalists receive slightly less. Students must maintain a "B" average for financial support.
- *Faculty Involvement*—Department chairs and senior faculty are involved in all aspects of the program from recruitment and mentoring to co–authorship and extra curriculum activities.
- *Study Groups*—This model form of studying has proven to be highly effective and strongly encouraged by the program.
- *Program Values*—Certain values are strongly emphasized, such as striving for excellence through academics, possessing character and social interaction, and adding value to students, peers, and others who benefit from the exceptional role modeling.
- *Program Community*—The Meyerhoff Scholarship Program represents a family-like, campus-based community for students. Staff meet with students regularly, and freshmen reside in the same residence halls during the freshman year.
- *Personal Advising and Counseling*—A full-time academic advisor and the program's Executive Director and other staff regularly monitor and advise students.
- *Tutoring*—Students are encouraged to use departmental and UMBC tutoring resources to optimize their course performance.
- *Summer Internships*—Meyerhoff staff and students use a network of contacts to place students in summer research opportunities around the world. They include AT&T Bell Laboratories, Centre Internationale de L'Enfance (France), NASA's Goddard Space Flight Center, Lancaster University (United Kingdom), Silicon Graphics Computer Systems, the Johns Hopkins University School of Medicine, Harvard University, and the Howard Hughes Medical Institute Laboratory.
- *Administrative Involvement and Family Support*—The program receives a wide range of support administratively from UMBC and the Meyerhoff Parents Association. The parents group is a support advocacy proponent of the program.
- *Mentors*—One of the most important facets of the program involves the partnering of the students with mentors from their field, who serve as crucial links to their education.

The National Science Foundation has indicated that UMBC has one of the largest concentrations of high-achieving African-American students majoring in science anywhere in the United States. Many indicators point to the success of the Meyerhoff Scholarship Program evident in the following statistics. The retention rate in the program is more than 95 percent, and the 205 currently enrolled students have a grade point average of 3.49 out of 4.0. One hundred and twenty-two of the 146 gradu-

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ates are presently enrolled in Ph.D. (62), M.D. (33), M.D./Ph.D. (12), M.D./M.P.H. (1), M.S. (13), or post baccalaureate (1) programs at nationally recognized universities. Examples include the Massachusetts Institute of Technology (MIT), Cornell University, Stanford University, the University of Michigan, Northwestern University, the Georgia Institute of Technology, the University of Virginia, Rice University, the University of North Carolina at Chapel Hill, Carnegie Mellon University, the University of California at Berkeley, the University of Maryland at College Park, Harvard Medical School, Yale University School of Medicine, Emory University School of Medicine, Duke University School of Medicine, Baylor College of Medicine, George Washington University School of Medicine, Meharry Medical College School of Medicine, Morehouse School of Medicine, Temple University School of Medicine, University of California at Davis School of Medicine, University of Pittsburgh School of Medicine, Washington University School of Medicine, Columbia University College of Physicians and Surgeons, University of Health Sciences F. Edward Horbert School of Medicine, the University of Pennsylvania, Johns Hopkins University, Case Western Reserve University, New York University School of Medicine, and UMBC.

Because of its success, attributable largely to systematic mentoring, UMBC's Meyerhoff Program has attracted considerable national visibility. As a result of this program, UMBC was among the first recipients this past year to receive the U.S. President's Award for Excellence in Science, Mathematics, & Engineering Mentoring. In addition, the program's success has led to a variety of other institutional initiatives designed to increase the numbers of both:

1. Undergraduate minority students who succeed in science and subsequently pursue graduate and professional degrees in scientific fields
2. Graduate students in biomedical research

Since the development of the Meyerhoff Program, UMBC has developed:

1. A McNair Scholars Program
2. A National Science Foundation–funded Alliance for Minority Participation Program (which UMBC administers in collaboration with University of Maryland's College Park and Eastern Shore campuses)
3. A National Institutes of Health (NIH)–funded Minority Access to Research Careers Program
4. An NIH-funded Minority Biomedical Research Support Award to expand the participation of minority graduate students in biomedical science

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Meyerhoff Scholarship Program

All of these programs focus on close faculty-student interaction, active mentoring, early research experiences, and regular discussions about academic performance. What is significant is not only the extent to which the students work in laboratories, but also the many opportunities they have to discuss their research and become confident using the language of scientists and explaining difficult concepts with clarity. The students also learn not to be embarrassed about being knowledgeable and are treated as young colleagues by senior faculty.

Substantial outside support is currently received from the Meyerhoff Foundation and other public and private sources, including, among others, Abell, Adams/Rodgers, Apple Computer, AT&T, Batza, BGE, Chevron USA, Dresher, DuPont, Eli Lilly, GE, Greenbaum, Hearst, Linehan, Lipitz, Meridian Health Care, NASA, the National Science Agency, NIEHS, the National Science Foundation, Pfizer, Inc., Richman, Sloan Foundations, Sony Foundations, Sony Entertainment, UNCF/Merck, the U.S. Department of Energy, and W.R. Grace.

University of North Carolina at Pembroke Undergraduate Scholars Awards for Research

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The intent of the Undergraduate Scholars Awards for Research program at the University of North Carolina at Pembroke is to develop, through minority serving institutions, a pool of talented scientists and engineers in fields related to NASA's mission. In addition, the program is committed to providing a stable and substantial support system to serve as an effective intervention model that facilitates the quantity and quality of underrepresented minority graduates equipped to compete for career opportunities in the scientific community or pursue graduate study. The university's historical mission as the first state-supported 4-year institution to educate Native Americans blends well with the goals and objectives of NASA MUREP.

The University of North Carolina at Pembroke graduated more Native Americans in the field of science than any college or university in the country in 1997–98. The Undergraduate Scholars Awards for Research Grant at the university is the most prestigious award available to students and is extremely beneficial in attracting and retaining students to the field of science and to the university.

The university had three participants in the program during 1997–98 with a grant award of $32,000. One student graduated, summa cum laude, in May and is a first–year medical student at the University of North Carolina at Chapel Hill's School of Medicine, an excellent example of the value of a solid science background. For the summer research experience, one student was at NASA's Ames Research Center in California conducting research on the development of the tiles for the X-34 space vehicles. This was quite an experience for a hometown student from the east coast. The other student was involved in a research project on campus that focused on the immobilization of enzymes on certain membranes while measuring the enzyme activity by means of electrochemical measurements to be applied to the characterization and construction of glucose sensors with glucose oxidase immobilized on a Pall Nylon membrane. The results of this student's work will be presented at a national conference by one of the university's professors.

The University of North Carolina at Pembroke is proud of the accomplishments of its NASA scholars past and present. The university looks forward to continuing its participation in this outstanding program. The research experience and the financial support are invaluable to the students. Participants in the program receive much but also give much. The dollars are well invested at the University of North Carolina at Pembroke, which is grateful to be a part of this NASA program.

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University of Texas–Pan American Undergraduate Scholars Awards for Research

The University of Texas–Pan American received its first NASA training grant for undergraduate scholarships and summer internships in 1991. Since then, all but one participant have been engineering students. Currently, there are six engineering students in the NASA Undergraduate Scholars Awards for Research program at the university. Five of them participated in a wide variety of summer research projects.

One senior mechanical engineering student's project involved converting motion pictures of a moving object into a scaled three-dimensional representation of the object using Visual C++. The project is in combination with another research group at the University of Texas at Austin. Another student worked with a professor to develop an instruction manual for engineering students who will use MathCad 7.0 in their courses.

Other projects included the development of titanium laminates for dentures, replacing traditional materials. Two methods of vacuum forming the laminates, diffusion bonding of Ti films and bonding Ti films with a polymer film, were the experimental goals. A student paper to be presented at a regional meeting of the American Society for Engineering Education is expected from this project.

One freshman student worked with a professor developing materials for the Internet. The Web site will present the results from an experimental laboratory in which four different mechanical systems are under automatic control by digital electronic systems. University students will be able to access the site and examine the behavior of the mechanical systems under different control environments.

During the summer, one student became interested in the National Society of Automotive Engineers and is now involved in forming a student chapter at the university. She wants the university to enter the society's national student competition to develop a "Mini-Baja" competition car. To promote her ideas, she will give a presentation to the students and faculty in the Engineering Department this fall.

Two students made the academic Dean's List in both the fall and spring terms of academic year 1997–98. One of these was selected to the National Dean's List. A third student made the academic Dean's List in the fall semester. The engineering students belong to a variety of engineering organizations; several of the

Undergraduate Scholars

University of Texas–Pan American
Undergraduate Scholars Awards for Research

professional organizations have student chapters at the University of Texas–Pan American, such as the Institute of Electrical and Electronic Engineers, the Society of Manufacturing Engineers, the American Society of Mechanical Engineers, the American Society for Engineering Education, and the Society of Hispanic Professional Engineers. Also, clubs associated with the student professional organizations are active. Many students attend the annual HENNAC conference, sponsored by the Society of Hispanic Professional Engineers, especially to encourage students of Hispanic heritage in the engineering professions.

All students in the University of Texas–Pan American program graduated from high schools in the Lower Rio Grande Valley of Texas. Three of the six are female, and five are minority students.

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University of Texas at San Antonio Undergraduate Scholars Awards for Research

Overview

The purpose of the NASA Undergraduate Scholars Awards for Research program at the University of Texas at San Antonio is to develop a pool of talented scientists and engineers in fields related to NASA's mission. The program targets socially and economically disadvantaged students and individuals with disabilities, with special emphasis on those students from groups historically underrepresented in NASA programs. The goals of the program are to:

- Attract disadvantaged students at the beginning of their undergraduate studies to career paths in areas of science and engineering relevant to NASA's mission
- Retain these students in their fields of study through the completion of their undergraduate degrees
- Prepare students for success in advanced, research-based areas of study
- Increase the number of these students who pursue graduate degrees and research related and teaching careers in technical areas

During the 1997–98 academic year, seven students participated in the program at the University of Texas at San Antonio. Each student made satisfactory progress toward his or her degree, with three students graduating in May 1998. Two of the graduation seniors received bachelor of science degrees in biology, and the third one received a bachelor of science degree in geology. The other four students participated in summer research experiences at NASA facilities; two students worked at Marshall Space Flight Center in Huntsville, Alabama, one worked at Goddard Space Flight Center in Greenbelt, Maryland, and one worked at Dryden Flight Research Center in Edwards, California. Two of the four continuing students are majoring in computer science, and two are majoring in electrical engineering.

The program supports the participants by paying their tuition and fees and books and assisting them with their living expenses. Each student is provided a faculty mentor whose field of study is in the discipline of the student's major. Some students have the opportunity to accompany their faculty mentors to conferences and professional meetings, enabling the students to learn more about the research activities in their major fields.

Undergraduate Scholars

University of Texas at San Antonio
Undergraduate Scholars Awards for Research

Enrollment Data

There were a total of seven students participating in the program at the University of Texas at San Antonio during the 1997–98 academic year: three sophomores, one junior, and three seniors. The sophomores were one Hispanic female, one African-American male, and one African-American female. The junior was a Hispanic male. Two seniors were Hispanic females, and the other was a Native American female.

Outcomes

The project has been quite successful. Since its inception in the 1991–92 academic year, 15 students have participated in the program at the University of Texas of San Antonio. Seven of those students have graduated and are pursuing careers in science and engineering fields, and some are contemplating attending graduate school. Four students are still participating in the program, making exceptional progress toward their degrees. Over the 7 years, only four students have dropped out of the program: two for personal reasons and only two because of academic deficiencies. Table 1 shows the demographics of those 15 participants.

Partnerships

Although there are no formal partnership agreements, the program been very successful in placing its students at NASA facilities each summer for their required summer research experiences. Students have spent their summers at Kennedy Space Center, Johnson Space Center, Lewis Research Center, Langley Research Center, Goddard Space Flight Center, Ames Research Center, Marshall Space Flight Center, and Dryden Flight Research Center. One student has worked at the University of Texas at Austin Center for Space Research. This program is especially grateful to Johnson Space Center and Marshall Space Flight Center, which faithfully accept several of the program's students each summer.

Table 1. Participants in the Program Since the 1991–92 Academic Year

	Graduated	Continuing	Dropouts	Total
Hispanic Male	2	1		3
Hispanic Female	4	1	2	7
African-American Male		1	1	2
African-American Female		1		1
Asian Male			1	1
American Indian Female	1			1
Total Male	2	2	2	6
Total Female	5	2	2	9
Total	7	4	4	15

Graduate Fellows

Graduate Research Student Awards

Graduate student support programs generally provide fellowships, internships, grants, and other forms of support for students to carry out research and related activities. In some instances, awards are made to a particular HBCU, OMU, or organization that facilitates the awards to the student. In other cases, such as NASA's Graduate Student Researchers Program (GSRP), awards are made directly to the student. Overall goals of graduate student support programs include recruiting high-quality students to pursue graduate studies in NASA-related fields of science and engineering and maintaining appropriate numbers of high-quality scientists and engineers, who are generally underrepresented in mathematics, science, engineering, and technology (MSET) fields, in NASA-related fields. During fiscal year 1998, more than 800 students were supported through a variety of scholarship/fellowship programs. Among them are the following programs.

NASA MUREP Partnership on Graduate Student Researcher Program
National Consortium for Graduate Degrees for Minorities in Engineering and Science, Inc. (GEM)

The NASA/GEM bridge to the NASA GSRP was initiated in 1996 to provide opportunities for NASA MUREP undergraduate recipients to continue toward graduate-level education, leading to a terminal degree in NASA-related MSET fields. The master of science fellowships provide tuition, fees, and a $6,000 stipend at one of 78 GEM-affiliated research institutions. Fellows are assigned a NASA mentor, provided with a NASA summer research experience, and given the opportunity to attend seminars on topics related to their master's thesis.

Florida A&M University
A Graduate Fellowship Component to Augment Program IMAGE

The NASA/Florida A&M University Graduate Fellowship Component augments Program IMAGE, an undergraduate initiative at Florida A&M University. It was initiated in 1995 to increase the number of African Americans pursuing doctoral degrees in engineering. This program funds 15 fellowships, providing up to $22,000 per student per year.

Graduate Fellows

North Carolina A&T State University
Ronald E. McNair Graduate Research Fellowship Program

The NASA/North Carolina A&T State University bridge to the NASA GSRP was initiated in 1997 to provide opportunities for NASA MUREP undergraduate student recipients to continue in graduate education, leading to a terminal degree in a NASA-related MSET field. Fellowships provide tuition, fees, and a $6,000 stipend at one of several research institutions affiliated with the North Carolina A&T State University.

American Society for Engineering Education (ASEE)
Helen T. Carr Fellowship

The NASA/Helen T. Carr Fellowship Program is designed to provide incentives for students to pursue doctoral studies in engineering and teaching careers in minority institutions. The program is managed by ASEE with an HBCU committee serving as a board of directors. The fellowship program provides up to $10,000 per year to students selected by the member deans of the participating schools. It is currently supporting six fellows.

NASA Graduate Student Researchers Program (GSRP)

GSRP fellowships are awarded for graduate study, leading to research-based master's or doctoral degrees in the fields of science, mathematics, and engineering. Grants of up to $22,000 are awarded for 1 year and are renewable for a total of 3 years based on satisfactory academic advancement, research progress, and available funding.

Graduate Fellows

American Society for Engineering Education Helen T. Carr Fellowship Program

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To address the lack of engineering faculty role models at the nation's Historically Black Engineering Colleges, the Historically Black Engineering Colleges Committee of the American Society for Engineering Education (ASEE) instituted the awarding of yearly fellowships to African-American faculty members or students in pursuit of doctoral degrees. These fellowships have been named after the late Helen T. Carr, an official of the former Western Electric Fund in the early 1960s, who dedicated herself to assuring the continued support of such a fellowship program by sustaining corporate sponsors. The fellowship provides up to $10,000 per academic year to students who are pursuing doctoral degrees in engineering. Upon completion of their Ph.D. requirements, a Fellow is committed to return to the faculty of one of the participating Historically Black Engineering College institutions. NASA has supported this fellowship program since 1989. Corporate support for this academic period was also received from Bellcore and General Electric.

For this reporting period, a total of five engineering doctoral students received support:

- Vernal Alford ($10,000) is pursuing a doctoral degree in civil engineering at North Carolina State University and is sponsored by North Carolina A&T State University.
- Jeffrey Johnson ($5,000) is pursuing a doctoral degree in electrical engineering at Vanderbilt University and is sponsored by Tennessee State University.
- Kelvin Kirby ($5,000) is pursuing a doctoral degree in electrical engineering at Texas A&M University and is sponsored by Prairie View A&M University.
- Wanda McFarland ($10,000) is pursuing a doctoral degree in electrical engineering at Texas A&M University and is sponsored by Southern University.
- Viveca Noble ($10,000) is pursuing a doctoral degree in electrical engineering at Texas A&M University and is sponsored by Tuskegee University.

During this reporting period, two of the five candidates completed all of their doctoral degree requirements and returned to faculty positions at one of the sponsoring Historically Black Engineering Colleges. Kelvin Kirby completed all courses on his approved degree plan and was advised by his dissertation committee to apply for graduation in December 1997. Dr. Kirby received his Ph.D. in electrical engineering from Texas A&M University and returned to the engineering faculty at Prairie View

Graduate Fellows

American Society for Engineering Education
Helen T. Carr Fellowship Program

A&M University. Jeffrey Johnson completed all his doctoral degree requirements and returned to the engineering faculty at Tennessee State University. Dr. Johnson received his Ph.D. in electrical engineering from Vanderbilt University. His dissertation was titled "Blind Exploitation of Several Coincident Modulated RF Signals."

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Norfolk State University
Effects of Stretch Orientation on the Polymeric Properties of High Temperature Polyimides

Overview

Derek B. Klinedinst conducted research under the guidance of Dr. Jeffrey A. Hinkley of the Composite and Polymers Branch, Materials Division, NASA Langley Research Center, from September 1997 until August 1998, with the support of this GSRP project. He investigated the topic "Effects of Stretch Orientation on the Polymeric Properties of High Temperature Polyimides," which had been initiated during the summer of 1997 with other sources of NASA funding. Dr. Heidi R. Ries of Norfolk State University's Center for Materials Research served as the thesis advisor.

Research Abstract

An investigation into the parameters that control the stretching of the polyimide films LaRC™-IA, LaRC™-IAX, and (_-CN)-APB/ODPA and their subsequent properties has been carried out. A uniaxial stretching device was designed and built to optimize the variables that were believed to control molecular orientation in the films. The mechanical properties, which improve as a result of the newly acquired orientation, were measured via tensile testing. Evaluating the data produced by those tests optimized the stretch parameters. The variables that were optimized that effect the mechanical properties are temperature during stretch, strain rate, and ultimate strain induced. Stretches were performed at the glass transition temperature of each polymer up to a temperature 40 degrees over T_g.

Enrollment Data

This project supported one male Caucasian, who is a U.S. citizen and graduate student (master's level).

Graduate Fellows

Norfolk State University
Effects of Stretch Orientation on the Polymeric Properties of High Temperature Polyimides

Outcomes

Derek Klinedinst successfully defended his thesis on Wednesday, August 19, 1998. He has completed all other degree requirements and will receive his master of science degree in materials science pending submission of six copies of the finalized thesis for binding. The degree should be awarded in December 1998. In addition to the thesis, Laurent Feuz and Derek Klinedinst prepared an internal report titled "Stretching of LaRC™–IA" for use at NASA's Langley Research Center.

Klinedinst is presently enrolled in the Ph.D. in materials engineering science program at Virginia Tech. Virginia Tech will accept the majority of the graduate credits completed at Norfolk State University toward the Ph.D. requirements under an articulation agreement signed last year.

Teacher Enhancement and Training Awards

NASA is committed to increasing diversity among mathematics, science, and technology State-certified teachers. For the United States to achieve and maintain a position of economic leadership, all of its citizens must acquire the necessary skills to compete in an increasingly global, technological society. This requires our schools and teachers to deliver a world-class education to all students. Rapidly changing student demographics and a renewed emphasis on educational reform have increased awareness of the need to improve curricula and teacher preparation, to integrate theory and practice, and to determine what works in educating all of our students—particularly in the areas of mathematics, science, and technology.

Teacher training awards, the majority of which are MASTAP (Mathematics, Science and Technology Awards for Teacher and Curriculum Enhancement Program), increase the number and strengthen the technical skills and knowledge of socially and economically disadvantaged and/or disabled mathematics, science, and technology teachers. As a result of this award, selected preservice and inservice teachers will have knowledge of national and State teaching standards. Participants become State-certified and experienced in teaching at middle and high schools that have substantial enrollments of disadvantaged students.

Teacher training awards are funded annually and range between $30,000 and $225,000. The average award is $140,000. MASTAP awards, although refunded annually, are 3-year awards not to exceed $200,000 annually. The goals of teacher training awards are twofold. First, they are intended to increase the number of State-certified socially and economically disadvantaged and/or disabled teachers in schools with substantial enrollments of minorities by strengthening the technical skills and knowledge of underrepresented secondary mathematics, science, and technology preservice teachers. The second objective is to improve mathematics and science literacy among socially and economically disadvantaged and/or disabled preservice and inservice teachers who impact on middle and secondary school students.

Teacher Training Program Awards enhance the preservice curriculum to provide pedagogical models emphasizing

- Team teaching in middle and secondary schools with substantial numbers of disadvantaged students
- Mathematics and science standards and assessment
- Activities involving applications of critical thinking
- Culturally sensitive approaches to teaching science and mathematics

Teacher Enhancement and Training Awards

They also expand disadvantaged education students' knowledge of career opportunities as mathematics, science, or technology teachers. MASTAP projects disseminate information on successful strategies and models to other minority colleges and universities and to middle and secondary schools with significant minority enrollments.

Alabama A&M University
Curriculum Adjustments in Mathematics for Science and Engineering Programs

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Overview

The primary goal of this project is to investigate the effectiveness of curriculum adjustments in mathematics, which will influence student performance in science and engineering. The project seeks to:

- Conduct statistical research
- Develop a set of statistical models that connect university curriculum variables to student performance on course exit exams, standardized engineering exams, and the GRE
- Conduct calculus reform teaching experiments

Accomplishments

Workshops

During the summer of 1997, three mathematics faculty members attended a different 1-week calculus reform workshop. Because reform activities in calculus teaching are closely related to reform in statistics education, one faculty member attended a 1-week workshop on the teaching of statistics.

Computer Laboratory

A committee of three mathematics faculty members has reorganized the mathematics computer lab, which is being used for teaching, research, and testing. This grant has supported the acquisition of MAPLE and SAS software packages. Also, a computer adaptive math test package (COMPASS) has been installed, and a set of computer calculus exit tests is on order.

Faculty Participation

In addition to the activities of the Principal Investigator, three faculty members are directly involved in this project. Each of them has worked with exactly one of the following: (1) computer lab development, (2) calculus reform, and (3) curriculum and student performance.

Alabama A&M University
Curriculum Adjustments in Mathematics for Science and Engineering Programs

Principal Investigator

In addition to being project director, the Principal Investigator is the project statistician and is responsible for data collection, analyses, and model construction. Data collected by COMPASS and calculus computer exit testing are being uploaded into a SAS file for quick analyses.

Relevance to NASA Strategic Enterprises

The Earth Science Enterprise is currently conducting research that will connect space-based observations to onsite Earth observations to form a model that will be used for a variety of applications. This project adapts the model development tools of this mission to an education application, which will result in a model that will be used to enhance student academic performance.

Benefits to Society

The educational model mentioned above may be expanded to include elementary, high school, and college academic performance enhancement models.

Student Achievements

Two graduate and nine undergraduate students assisted with the physical setup of the mathematics computer lab and with its daily management. Undergraduates provided tutoring in mathematics.

Bethune-Cookman College
Operations of the Center for Space Education

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Bethune-Cookman College is responsible for operating the Center for Space Education, which includes the Educator Resource Center (ERC) and the Exploration Station (ES). The primary functions of the ERC is to encourage teachers to add science and aerospace-oriented subjects to their curricula and to help provide the materials to make the addition of these subjects successful. The ES was established to provide meaningful experiences in science and aerospace education for visiting students, teachers, and members of the general public. Both centers help define the mission of NASA and its Kennedy Space Center.

The ERC serves as a point of interaction and reference for educators from a wide variety of academic fields. The primary purpose is providing space-related materials for teachers and their students, much of which would be very difficult to obtain otherwise. These materials include audiotapes, 35-mm slides, and often-rare printed materials that can be copied on available machines—all at no charge. The ERC also has a large and steadily growing library of videotapes. Teachers are only required to furnish their own blank audio- and/or videotapes or slide film, and copying documents is free; the cost to the teacher or school is very minimal. The ERC also distributes pre-assembled teachers kits of about 24 items. Each kit provides a balanced package of documents, which give an overview of NASA and its programs and accomplishments. During this fiscal period, the ERC distributed 268,738 publications, audio/visual materials, and slides.

The ES is divided into two separate rooms, ES1 and ES2, and its activities are available to students from prekindergarten through 12th grade. These activities and displays are designed to clarify scientific concepts relating to aerospace research and exploration. Programs are held throughout the day, with the first part of the program, delivered in ES1, devoted to structured, interactive programs and the second part of the program, held in ES2, devoted to hands-on aerospace and science activities.

Students visiting the ES learn about space activities through observing and participating in experiments and by contact with actual space hardware. Teacher groups also participate in programs in the ES to gain an understanding of what their students can expect. Typical presentations cover aeronautics, space propulsion, a simulated Space Shuttle launch, living in space, and exploring the solar system. During this past fiscal year, there were 3,032 programs delivered in the ES to 153,754 participants.

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City College of New York–City University of New York NASA Goddard Institute for Space Studies (GISS) and City University of New York (CUNY) Partnership for the Institute on Climate and Planets

Overview

The NASA GISS/CUNY Institute on Climate and Planets (ICP) is both a research and education program designed to establish a solid bridge between the scientific research and educational communities. GISS's unique location in New York City enables this program to be conducted in the country's largest urban precollege and undergraduate public school systems. This location positions the GISS, CUNY, and New York City school collaboration to achieve the ICP's ultimate aim—to create a bridge from science to education that develops the highest level of science and mathematics achievement among minority students, as well as create a network for their advancement in these fields.

There are three components of the ICP model to achieve these goals, each building on one another and functioning in a continuous feedback loop. These components are directly related to goals in NASA's strategic plans for equal opportunity, education, and Earth science. In addition, each program component is defined by measurable outcomes.

The first component, which also established the ICP, is student and faculty research. GISS has created real roles for students and faculty in junior high schools, high schools, and colleges to contribute to NASA's climate research program. This is the fundamental building block of the ICP. Through collaborative research experiences with scientists, students have a tangible way to enter the science pipeline, and faculty members gain the expertise and resources to create similar research experiences for a broader population of students at their schools.

The second component is the school network. Faculty at 18 schools (two junior high schools, nine high schools, and seven colleges) are field-testing the implementation of research projects and curriculum motivated by ICP research experiences to extend a bridge from the GISS research institute to all the schools in the ICP's growing network. The capabilities developed at the GISS-based ICP are being transferred to schools to build institutional capabilities that extend the NASA research community into urban schools. During the 1997–98 school year,

Other Teaching Programs

City College of New York–City University of New York GISS/CUNY Partnership for the Institute on Climate and Planets

232 students (an estimated 95 percent of whom are minorities) participated in school-based ICP programs.

The final component is currently under development to synthesize the research and education experiences developed in the ICP since 1994, as well as the educational materials and instructional strategies field-tested into a teacher education course—ICP Earth Climate Course (ECC). The ECC will complete the ICP model's feedback loop, connecting GISS, schools, and teacher education into one unified program. The strength of the ICP model lies in the design that builds on student/faculty research experience, cultivates required relationships between scientist-educator teams, and involves all the key institutional players needed to affect systemic and sustainable change.

Outcomes

The major outcomes for the ICP fall into three categories related to the main program goals:

- Excellence in science and mathematics curriculum and instruction
- Science literacy to understand Earth system science
- Workforce preparation for creating diversity in the science pipeline

Toward these ends, faculty, students, and scientists created a web site for schools to use as a resource to function as a research and educational network. Via the web, schools accessed more than 30 education models and 20 research projects in which to engage at their schools. Student work from one of these projects is being used as an example for addressing the New York State Science Standards. In terms of science literacy, for the first time, more than 60 students from campus-based ICP participating programs presented research at Fall Progress Reports and Spring Conferences at GISS. Scientists commented that students had a fundamental understanding of their research, its significance, and underlying science.

Several students led Space Quest, a Saturday enrichment program for elementary school students and teachers. These sessions were developed by ICP students to engage 100 younger students in their research. Teachers attending these sessions used Space Quest educational materials in their classrooms.

Data Enrollment

Overall, 61 students have participated in the GISS-based summer and academic year research program. Of these students, 36 are

City College of New York–City University of New York
GISS/CUNY Partnership for the Institute on Climate and Planets

African Americans (24 male and 12 female), 20 are Hispanics (8 male and 12 female), and 5 are nonminorities supported by other funding resources. More than 50 percent of the students have retained their participation in the ICP for more than 2 years. All students are progressing to increasingly higher levels of science and math; more than 37 percent began in high school, graduated, and entered 4-year colleges. Of the students who graduated from college, six are working in MSET-related fields, four plan to attend graduate school, and four are not yet certain about their plans.

Issues/Lessons Learned

The major issue for ICP was to sustain and develop each program component to enable the ICP model to function and test its capabilities to produce the intended outcomes for literacy, diversity, and science education. The major lesson was that while research can take place on school campuses, it should be introduced in a way that develops student skills and a knowledge base for inquiry.

At the conclusion of the 1998 ICP Summer Institute, participants were sent a questionnaire that asked them to evaluate their experiences at the program and to provide suggestions for the future development of ICP activities. The participants included 29 students, 15 faculty members, and 21 GISS scientists. The students were about equally divided between high school and college students; most of the faculty taught in high schools. To date, almost 80 percent of the participants have completed and returned the questionnaire.

The high school students were more likely to be female than male, and the opposite was the case for college students; the faculty were more likely to be male. The 1998 ICP Summer Institute was the first one for most of the high school students. Among the college students, the pattern was different, with about one-half having participated this past summer for the first time and the other half having participated in two, three, or four previous institutes. Three of four students said that being at the 1998 Summer Institute was a very important influence on their school and career plans, and the remaining students said it was a "somewhat important" influence. All of the students expect to work in a science or science-related field. Three of five seek to earn a doctoral degree. A few expect the highest degree they earn will be a master's, and the remaining (five) were undecided about how far they wanted to go in school.

Fayetteville State University Teacher Training Workshop-Graphics Calculator

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Overview

The Teacher Training Workshop-Graphics Calculator was designed to address the problem of how best to introduce technology into algebra, geometry, precalculus/calculus, and statistics and how to use the Internet as a resource for teaching and learning for HBCU faculty and deprived high schools across the southeastern United States. Emphasis was placed on participants gaining hands-on experience in the use of this technology and to understand the recent National Council of Teachers of Mathematics (NCTM) Standards for delivering effective mathematics instruction.

Workshop Sessions

The workshop consisted of 5 days with 6 1/2 hours of instruction per day, and on Monday through Wednesday, there were three 2-hour labs during the week of June 22–26, 1998. The four mathematics workshop sessions were as follows:

- Algebra/CBL was led by Sherman Sumpter, a high school algebra/trigonometry instructor in the Cumberland County School System.
- Geometry with the TI-92 was led by Duane Olson of Olympia, Washington.
- Precalculus/Calculus with the TI-92 was led by Dr. Kenneth Jones.
- Statistics with the TI-83 was led by Lane Peeler, a mathematics consultant for the South Carolina Department of Education.

Content and methods to teach and assess with the new technology were demonstrated, and participants were able practice in cooperative groups. Effective instructional methods were modeled according to the NCTM Standards. The most effective instruction with graphing calculators involved the use of a classroom overhead projection model; each presenter demonstrated this during the institute. Each participant received a TI-83 or 92 calculator. Each day, a TI-82/83/92 view screen was raffled. CBL's were available for participant use during the workshop.

The three evening workshops were as follows:

- Beginning Internet was led by Dr. Leo Edwards, Director of the Mathematics/Science Education Center at Fayetteville State University.
- Advanced Internet was led by Dr. Dan Wishnietsky of Winston-Salem State University.

Fayetteville State University
Teacher Training Workshop-Graphics Calculator

- Web Page Creation was lead by Bill Gibson, Training and Web Site Coordinator for Management Information Systems at Fayetteville State University.

Enrollment Data

There were 97 participants; 39 were HBCU faculty members, 3 were community college faculty members, and 55 were high school teachers. Fifty-one were African Americans, 6 were Asian/Pacific Islanders, 1 was Hispanic, 6 were West Indians, and 29 were European Americans. Participants came from Alabama (7), Florida (1), Georgia (9), Louisiana (2), Maryland (2), Mississippi (2), New Jersey (1), North Carolina (47), Ohio (7), Pennsylvania (1), South Carolina (4), the Virgin Islands (9), and Virginia (5). Participants were recruited from the pool of previous graphics calculator workshop attendees, through mailings to all HBCU's, and through the distribution of brochures at professional meetings and conferences. Registration information was also placed on the center's web site.

Outcomes

Based on the participants' evaluations, the workshop was a great success. This institute will have a multiplier effect in enabling participants to share their knowledge with other instructors at their respective HBCU's and high schools, and it will serve as a catalyst to inspire disadvantaged youth to experience the power of visualization in mathematics via the TI-82/83/92 calculators and computers. Such empowerment should enable additional students to persist and appreciate higher levels of mathematics, as well as increase the recruitment, retention, and graduation rates in mathematics and other sciences.

A midyear followup is planned to encourage and sustain growth and development along with a midyear evaluation and survey of technology use at respective participating institutions. These data will serve as a benchmark for follow-up sessions and research in the use of technology in HBCU's and high schools. Follow-up visits at various sites are planned to assist in schools where needed in implementing the new technology.

Partnerships

Through a partnership with the Eisenhower Consortium @ SERVE, 55 high school teachers from the southeastern region were also participants in this teacher training workshop. Through the NASA Empowerment Zone for Cleveland, Ohio, the center was also able to provide training to seven teachers from the area. The additional funds provided for travel, housing, and materials.

Fayetteville State University Generating Electronic Materials (GEM) for Teaching/Learning Mathematics and Science Teacher Training

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The Generating Electronic Materials (GEM) for Teaching/Learning Mathematics and Science Teacher Training project was designed to impact student learning by developing a contemporary scientific and technical cadre of teachers (grades 1–6 and 9–12) to improve their science and mathematics literacy with technology and distance learning. The targeted audience of this project consisted of 48 elementary teachers in self-contained classrooms, 10 high school teachers, and 3 MSET majors. All of the schools have predominantly minority enrollments, poverty levels requiring free and reduced lunches, and low performances on State and national evaluations.

Elementary teachers, based in Cleveland, attended a 1-week workshop that focused on integrating technology in classroom instruction as a tool for teaching and learning mathematics, along with across-the-curriculum integration. The instructional team included staff from Utah State University and Fayetteville State. The 6-hour days of intensive study culminated in a project that would demonstrate what each teacher knows and demonstrate what each is able to do in using technology as a tool to access real data to teach, learn, assimilate, and apply knowledge.

The instructional plan included the goals of the NASA High Performance Computing and Communications (HPCC) program within NASA's Aero-Space Technology Enterprise, the national standards in mathematics and science, the Cleveland (Ohio) Public Schools' Course of Study, and the Ohio Competency Based Mathematics (K–12) and technology competencies. All teachers demonstrated knowledge and the ability to use PC Windows, data base management, optical technology, Internet and intranet, web page creations, and creations of grade-level lesson plans and projects using the Internet and intranet. They also could prepare action plans for school-wide use, access NASA resources for Earth and space studies, and practice and use distance learning.

A monthly electronic conference update will be held via the web. Students and teachers at each school involved in the project will learn how to create web pages and have a web page with monthly updates. Two follow-up sessions, in the fall of 1998 and the spring of 1999, were scheduled. The instructional focus of these sessions will be on demonstrating problem solving, investigating processes in a group/team setting, using technology at appropriate times, and employing off-line activities (sponge activities) at appropriate times to integrate mathematics/science concepts.

Other Teaching Programs

Fayetteville State University Generating Electronic Materials (GEM) for Teaching/learning Mathematics and Science Teacher Training

A set of high school teachers also attended training at the Technology Institute for graphing calculator instruction sponsored by the Mathematics/Science Education Center at Fayetteville State University. The Technology Institute provided training on how to incorporate the graphics calculator into mathematics instruction. Sessions were also held on the Internet and the World Wide Web and on web page creation.

Florida International University
Project VISION: Very Intensive Scientific Intercurricular On-Site Education

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Overview

Project VISION is a joint effort among NASA's Kennedy Space Center, Florida International University, Universidad del Turabo, Miami-Dade County Public Schools, and Caguas/Gurabo Public Schools in Puerto Rico. The project's main mission is to institutionalize change among the middle school science and math teachers at participating public middle schools.

NASA set up this project to support the President's Executive Order 12821, "Improving Mathematics and Science Education in Support of the National Education Goals." The ability of the United States to maintain leadership in the world economy depends in part on its ability to educate and train talented scientists and engineers. This process must begin as early as kindergarten, or even sooner. For college students to succeed in careers in science, math, or engineering, they must first be prepared at the precollege level. This preparation must include instilling motivation and enthusiasm for the subject matter, as well as producing an in-depth understanding of the principles of mathematics and science. Project VISION attempts to achieve these requisites and, at the same time, institutionalize the correlating methodology that produces these achievements through the use of learning modules with their hands-on and minds-on activities.

The use of learning modules that require hands-on and minds-on activities in a classroom setting garners great enthusiasm and motivation on the part of the target students for the understanding of the lesson's underlying math and science principles. With this enthusiasm and motivation comes acceptance, attention, discipline, acquiescence, and collaboration. In addition, the use of hands-on activities may also require learning through a gamut of senses. Not only can the student use his or her eyes and ears during these activities, but most times, they can also use their senses of touch, smell, and taste, as well as intuition. Learning is, therefore, achieved using most or all the senses. The combination of motivation/enthusiasm and the use of multiple senses creates an ideal environment conducive to learning at a profound level.

The importance of this project is not its ability to achieve by itself these sets of conditions that will result in better prepared students, but rather the project strives to institutionalize these conditions among the participating public school teachers so as to establish an enduring system of experimentation and hands-on activities that will last long after the project's termination. The

Florida International University
Project VISION: Very Intensive Scientific Intercurricular On-Site Education

project did not need to generate any new educational materials to fulfill its mission. Rather, Project VISION has used the vast quantities of high-quality learning modules, hands-on experiments, and additional educational materials available at NASA (*http://spacelink.nasa.gov*) and other scientific depositories. The project identified, adopted, adapted, tested, and then implemented those learning modules that best met the needs and capabilities of the target student and teacher populations. The project also provided the participating teachers with training on the use of computer technology and on accessing the Internet.

Both Florida International University and the Universidad del Turabo "adopted" middle schools to participate in this project. During the first year of operations, the project focused on seventh grade science and math teachers, as well as all the seventh grade students. During the second year, this project will be expanded to include the sixth and eighth grade (eighth and ninth grades in Puerto Rico) science and math teachers, as well as the students from those grades.

The Project VISION staff implemented three two-learning modules with each participating science and math teacher. These teachers served as both assistants and observers during the first two implementations. During the third implementation, the teacher worked alone to identify, adopt, adapt, test, and implement learning modules on his or her own. The result is the institutionalization of the process of bringing learning modules, with their hands-on and minds-on activities, from the Internet to the classroom curriculum. Each of these teachers now has access to unlimited quantities of educational materials/learning modules to complement or supplement his or her regular class curricula. Project VISION has even established a web site that contains links to hundreds of learning modules that the project's staff located on the Internet (*http://www.eng.fiu.edu/vision*). These links are grouped by educational level and by subject (math or science). In addition, they have also been classified according to the Competency Based Curriculum of the Miami-Dade County Public Schools. Plans are being made to also classify them according to the national educational students so as to serve the entire national community of teachers and students.

Florida International University
Project VISION: Very Intensive Scientific Intercurricular On-Site Education

Major Goals and Objectives

The major goals and objectives of Project VISION are to:

- Develop a model of collaboration between NASA's Kennedy Space Center, public school systems, industry representatives, public middle school science and math teachers, public middle school students, two institutions of higher learning, and faculty and students from science, mathematics, education, and engineering disciplines
- Enhance the public middle school science and mathematics curricula through the use of NASA electronic resources and educational materials, as well as other sources
- Empower the public school teachers by enhancing their understanding of mathematics and science principles and by enhancing their science and math curricula through the use of state-of-the-art materials integrated within their teaching methodology
- Establish greater participation in existing academic competitions (that is, science fairs, SECME District Olympiads, and so on)
- Increase the average scores in science and math subjects, as well as in the regular classes, and increase the overall average scores in the standardized tests
- Increased parental involvement in the educational process of their middle school children to foster a greater sense of motivation and responsibility within the children
- Expose the middle school students to examples of real industry professionals/mentors so that they can see, firsthand, the rewards and challenges of a professional career in science and engineering

Enrollment Data

During its first year, Project VISION focused on the seventh grade level. Through its teacher training program, the project has been able to impact seventh grade students at four public middle schools in Miami, Florida, and in Caguas/Gurabo, Puerto Rico. Most of the students at these four participating middle schools are from traditionally underrepresented or disadvantaged segments of the populations. This program affected a total of approximately 800 students.

The teacher training component of Project VISION took place onsite at the four participating public middle schools and, specifically, during the regular math and science classes conducted by the teachers targeted during this first year. These activities have first resulted in a cadre of approximately 30 science and math teachers trained to access hands-on learning modules from the Internet for presentation to their respective classes. Second, as this training took place in front of a student audience, the

Florida International University
Project VISION: Very Intensive Scientific Intercurricular On-Site Education

students received the benefit of participating in hands-on activities that helped them better understanding the principles of math and science.

Outcomes

During this first year, the project has been able to train 30 science and math public school teachers to identify, adopt, adapt, and then integrate learning modules into their classroom curricula. These teachers can now search the Internet to find sites, such as NASA's Spacelink web site, to obtain high-quality learning modules. They are also able to adapt these learning modules to more precisely fit the grade level and capabilities of their classes.

Another accomplishment of year one consists of the names and Internet addresses of more than 100 learning modules identified and presented to a classroom audience. This listing of addresses was made available to all the participating teachers for their future use and reference. In addition, the project has developed a web site that lists these learning modules and provides their Internet sites of origin. This, then, becomes a national resource for teachers all over the country to access and use for their own classes.

Partnerships

Project VISION has counted on the close participation of its partners in the activities of the program. First, as both sponsor and guide, NASA and its Kennedy Space Center have provided invaluable resources, learning modules and materials, and guidance, as well as critical opportunities to disseminate information related to this project. Second, Project VISION has been able to recruit engineers, scientists, and mathematicians from the public and private sectors, as well as community leaders, to serve as industry mentors and role models for the students participating in this program. These industry mentors have provided their time, at no charge, to work and interact with these students. They have provided their expertise, wisdom, and even some financial support to assure that society's next generation of leaders is prepared to assume its full responsibilities with confidence.

The project has also been able to obtain the strong assistance of the Urban Systemic Initiative staff of the Miami-Dade County Public Schools. These education specialists have assisted the project in the various activities and projects surrounding the training of teachers and the establishment of SECME (Science, Engineering, Communications, Mathematics Enhancement) student clubs at the participating public schools. Finally, the project has been able to count on local public and private agencies and organizations to contribute funds, materials, speakers, and other items necessary for the enhancement of this program.

Humacao University College Mathematics, Science and Technology Teacher and Curriculum Enhancement (MASTAP) Program

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Overview and Objectives

High school mathematics and science education in the eastern part of Puerto Rico is chronically short of certified teachers. Some courses are covered by teachers of other preparations or by competent science bachelor of science graduates lacking formal didactical training. By 1995, Humacao University College proposed to NASA a joint effort to remedy this situation with a single main objective: prepare teachers for certification in math and science. The project addresses the two most proper populations: actual teachers with no certification and Humacao University College math and science students planning to pursue a teaching career. The project offers, according to the requirements of the certifying authority, contents courses for the teachers and the teaching education curriculum for the college math and science students. The project, approved for a 3-year period, will produce 25 certified teachers, after the second year, for the three subsequent years. To ensure lasting satisfaction of the need, Humacao University College will commit to project institutionalization.

Enrollment Data

The project started in January 1996 with eight students and five teachers enrolled. By August 1996, 25 (20 students and 5 teachers, as planned) new participants entered the program. By May 1997, four advanced students graduated, and three of them obtained certification. Concurrently, 25 more participants entered the program. By May 1998, seven students graduated, and seven teachers completed their MASTAP curriculum. Also, except for one student, all have obtained certification. By December 1998, 13 more graduated, completed curricula, and eventually apply for State certification. In the meantime, 12 more students have entered the program. Currently, there are 30 students and 12 teachers enrolled. All participants are Hispanic, and the project serves a historically underrepresented population.

Humacao University College Mathematics, Science and Technology Teacher and Curriculum Enhancement (MASTAP) Program

Outcomes

It was in 1997–98 that the project realized the first main outcomes, with 18 certified math and science teachers entering the State educational system. By December 1998, 13 more professionals did so. All MASTAP students have passed the State-required certification exam, and all of them with above State average marks. New courses in methodology and science and mathematics education have been introduced to the education curriculum. Practicum activities for future teachers have been implemented with the help of the project's main partners.

Partnerships

Already existing partnerships with the State Department of Education and some private secondary schools have been reinforced as they provide means and cooperating teachers for project students to do the teaching practice.

Morehouse School of Medicine Neurolab Education Program

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Overview

The goal of the Neurolab Education Program is to produce instructional material to engage the Nation's students and teachers in the space life sciences investigations associated with NASA's Neurolab Space Shuttle flight (STS-90) and to produce a television documentary chronicling the history of the Shuttle mission for lay audiences. Program objectives for the period September 1997 to August 1998 were the production and dissemination of the curriculum supplement, *The Brain in Space: A Teacher's Guide With Activities for Neuroscience,* and the production and promotion of a 1-hour public broadcasting television documentary on the Neurolab mission. Both objectives have been met with the publication of the curriculum supplement and the completion of the television documentary released in the fall of 1998.

The Teacher's Guide

Part One of the Teacher's Guide begins with overviews of Neurolab and the nervous system, as well as background information on space life sciences, space neuroscience, and space life science research. The sections on space life sciences focus on changes in organisms under conditions of microgravity, whether or not organisms can withstand these changes, finding ways to make space flight safer, and applying space technologies to solve scientific and medical problems on Earth.

Part Two of the guide contains lessons and activities that demonstrate and/or examine the effect of weightlessness and other aspects of the space environment on five areas: developmental and cellular neurobiology, vestibular function, spatial orientation and vi-quo-motor performance, autonomic nervous system regulation, and sleep and circadian rhythms. The activities emphasize hands-on/minds-on involvement, prediction, data collection and interpretation, teamwork, and problem solving. A brief science background section that amplifies the concepts covered in the activity accompanies each activity. A matrix illustrating how each activity relates to the National Science and Math Education Standards and a section on the scientific method are included.

The U.S. Government Printing Office printed 10,000 copies of the Teacher's Guide. Comprehensive dissemination using targeted mailing, Internet, television, and teacher training is under way.

Other Teaching Programs

Morehouse School of Medicine
Neurolab Education Program

The Neurolab Television Documentary

The Neurolab television documentary, *Exploring Two Frontiers: The Neurolab Space Shuttle,* is the Neurolab Education Program's main public outreach effort. Television has the power to reach significant new audiences, to put a human face on science, and to bring the marvels of space exploration to ordinary Americans.

The 1-hour television documentary, narrated by the actor LeVar Burton, traces crew training for the Neurolab mission and features four of the experiments performed on the mission. Documentary viewers meet four individuals who have hopes that the research performed on Neurolab may one day improve their medical conditions or help others with similar conditions in the future. Filmed over the course of the past year, the documentary includes interviews with the crew, Principal Investigators, and the Mission Management Team as they prepare for an unprecedented and unique exploration of two frontiers—space and neuroscience.

Partnerships

The Neurolab Education Program could not have accomplished these objectives without the active participation of the following partners:

- ***Atlanta Educational Telecommunications Collaborative, (AETC) Inc. (WPBA-TV30)***—The television documentary was produced in close collaboration with Public Broadcasting Atlanta. The documentary was written, filmed, and produced by AETC professionals. AETC is promoting the documentary for public broadcasting.
- ***NASA***—Two offices at NASA Headquarters and three NASA Centers helped with a 4-day Neurolab teacher training session conducted for Atlanta Public Schools science teachers. NASA's Code UL (the Life Sciences Division) provided expert guidance and formal approval for all deliverables. Code FE (the Education Division) provided consultation and editorial support and printed 10,000 copies of the Teacher's Guide. Ames Research Center provided expert and editorial consultation for the Teacher's Guide and facilitated the filming of the documentary at Ames. Johnson Space Center provided filming, editorial consultation, and personnel to participate in the teacher training program. Kennedy Space Center provided filming and technical support.
- ***The Nashville Symphony Orchestra Headquarters, United Pared Services (UPS), Mount Sinai School of Medicine, Harvard Medical School–Brigham and Women's Hospital, and Vanderbilt University***—These institutions provided sites for filming the Neurolab documentary.

Other Teaching Programs

- ***SCITREK Science and Technology Museum, The Carter Center, National Space Biomedical Research Institute, the National Institutes of Health Division of Fundamental Neuroscience, the University of California at Davis, and the Massachusetts Institute of Technology***—These institutions were represented on the Neurolab Education Program's National Advisory Board.
- ***Morehouse School of Medicine Neuroscience Institute***—The institute provided scientific consultation for the Teacher's Guide and the television documentary.
- ***Scientists***—Thirty-four scientists, representing 26 institutions, contributed to the final lessons and activities.

Morehouse School of Medicine
Neurolab Education Program

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Norfolk State University Summer of Seasons: Summer Workshop Program for Emerging Educators in Earth System Science

Overview

The Summer of Seasons project was proposed to introduce emerging educators with a functional understanding of the use of NASA satellite data in the classroom and the relevance of available educational resources in Earth system science for addressing the National Science Standards. A special emphasis was to be placed on the use of advanced technologies to dispel the commonly held misconceptions regarding the cause of the seasons—that is, it is warmer in the summer and colder in the winter because Earth is closer to the Sun in the summer months.

Enrollment Data

Thirteen preservice teachers (a mix of graduate and undergraduate), 18 inservice teachers, and a dozen other undergraduates and graduates participated in the activities sponsored by the Summer of Seasons project. The majority of the participants were African American. Although women were the majority among the teacher group, there was more equity in gender in the other undergraduates who participated in BEST Fest. Eight college faculty, two NASA employees, and two administrators also attended BEST Fest. A beta run of some workshop activities was held at the National Science Teachers' Association meeting in Las Vegas when the project directors previewed the DAACeSS CD–ROM for a diverse group of about 70 teachers who attended the "Get Global" workshop offered by the BEST Lab team.

Outcomes

A daylong celebration of science education with seminars and miniworkshops for teachers, college faculty, science majors, and teacher candidates was held as a kickoff for the program. This event, BEST Fest, was hosted by Norfolk State University's Center for Excellence in Science Education, the BEST Lab (Bringing Education and Science Together). An exciting part of BEST Fest was the formal launch of the field-test version of the DAACeSS CD–ROM, a multimedia resource for Earth system science educators that was developed at Norfolk State. Each educator attending either BEST Fest or the weeklong workshop that followed received hands-on training on the installation and operation of the CD, which is available for both Macintosh and Windows.

Other Teaching Programs

Free copies of the CD were handed out to all the more than 60 attendees of BEST Fest, with an offer of free technical support for anyone who needed help in getting installed on computers back at their own school. Other BEST Fest activities included miniworkshops on laboratory exercises to study the role of oceans in climate change, given by Elizabeth Smith of Old Dominion University, and an overview of the ozone-based curriculum being developed by NASA's Goddard Space Flight Center.

The majority of teachers who continued with the weeklong workshop (for graduate credit) that immediately followed BEST Fest expressed initial concern over their ability to use technologically intensive materials in their classroom. The hands-on training they received during the week in the assembly of electronic resources (such as graphics and charts) into a powerful interactive learning tool using a presentation program, such as Microsoft PowerPoint, gave them all the confidence to return to their classrooms and fully use their school's multimedia resources.

Norfolk State University
Summer of Seasons: Summer Workshop Program for Emerging Educators in Earth System Science

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Norfolk State University
Pre-Service Teacher Enhancement Institute

Overview

The purpose of the Pre-Service Teacher Enhancement Institute was to provide an intensive, hands-on 2-week mathematics and science experience for 60 elementary and middle school preservice teachers. The objectives were to:

- Increase the preservice teachers' content knowledge in the areas of science, mathematics, technology, and aeronautics
- Model and promote the use of scientific inquiry through problem-based learning for participants who are preparing to teach young children
- Provide preservice teachers with hands-on activities and experiences to be used with their own students in teaching science and mathematics
- Give preservice teachers opportunities to use computer technology as a resource for telecommunicating with other teachers, for finding curricula resources on the Internet, and for using electronic technologies to support teaching and learning

Enrollment

Seventy preservice teachers from nine states and the District of Columbia were enrolled in the institute. These students represented 24 colleges and universities that serve large minority student populations. They were classified as juniors, seniors, or first-year graduate students who had not yet entered the teaching profession. Mathematics and science faculty as well as education faculty recommended students from their universities.

Outcomes

Evaluation included analysis of data from the participants' daily logs, daily completions of the Education Computer-Aided Tracking System (EDCATS), interviews, and pre- and postsurveys. The participants increased their knowledge and/or skills in aeronautics, the use of technology, understanding of the role of standards and benchmarks in science and mathematics instruction, curriculum change, problem-based instruction, current air and space science research, and innovative math/science resource access skills.

As a result of this program, NASA's Langley Research Center was able to increase its outreach in training teachers for laying the foundation in science and mathematics. All program participants

were enrolled in the PSTI Ambassadors and developed plans for sharing their knowledge with peers at their home institutions. Follow-up strategies were designed to enhance the network established by the institute.

Issues and Concerns

Plans to provide each participant with a laptop computer to facilitate electronic journaling and expanded networking after the institute concludes should be explored for the next series of institutes. Furthermore, faculty advisors from the home institutions should be included in at least several days of the institute to facilitate followup and the expansion of skills developed by the participants.

Norfolk State University
Pre-Service Teacher Enhancement Institute

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Norfolk State University
Project eSS—NASA/Norfolk State University Cooperative Agreement for Research and Curriculum Development in Earth System Science

Overview

Project eSS has been active for the past 3 years in facilitating access by scientists and educators to atmospheric satellite data stored at NASA's Langley Research Center DAAC (Distributed Active Archive Center). An intensive program of infrastructure building, technical capacity building, multimedia design and development, curriculum writing, and science education research has been ongoing. The DAACeSS CD–ROM has been produced and is being field-tested at various sites around the country. The awareness of NASA's educational resources has been much enhanced through a regular series of seminars for students, faculty, staff, and K–12 teachers, organized and hosted by the BEST Lab—a campus facility for innovation in science education developed as part of the project.

Enrollment Data

The development team for the curricular aspect consisted of four Norfolk State University faculty members, students (both education and science majors), inservice teachers, external consultants, and technical staff. Graduate students from the School of Education joined a four-person teacher team representing elementary and middle schools in three local school districts. Six undergraduate students worked as research assistants performing duties in various aspects of BEST Lab outreach, web site creation and maintenance, and graphic arts and multimedia design for the CD–ROM.

More than 200 Norfolk State students, faculty, and teachers have attended the BEST Lab seminar series established through this project. These seminars have offered opportunities for hands-on experience and training with instructional materials related to NASA's Strategic Enterprises.

Other Teaching Programs

The Project Potential Mentor Program coordinated by Norfolk State, NASA's Langley Research Center, and Chesterfield Academy in Norfolk brought together more than 50 graduate students as mentors for more than 100 elementary school students to work on study skills, problem solving, and kinesthetic learning. Field trips to Langley and the Virginia Air and Space Center highlighted this yearlong activity.

In all of the activities above, at least 75 percent of the student participants were African American.

Outcomes

Project eSS has had a tremendous impact on a wide variety of science education–related activities sponsored by Norfolk State. The creation of the BEST Lab as a research and testing laboratory for innovations in the teaching and learning of science has been a hallmark event (recently featured on a local cable TV show called "Inside NSU").

Demonstrations of NASA resources have been offered annually during the Norfolk State Science and Engineering Open House (attended by more than 300 middle and high school students). Invited presentations have been made at the annual NASA MU-SPIN User's Group Meetings, and an awareness has been created of the role of atmospheric science in education through the sponsorship of a regional physics education conference (1997), a regional gifted education conference (1996), and prominent participation by the investigators in the national meetings of the American Association of Physics Teachers and the National Association for Gifted Children.

The DAACeSS CD–ROM has been produced and is currently being field-tested. More than 500 requests for field-test copies have been received and processed. These included schools all over North America. Norfolk faculty, project staff, and students almost entirely created this CD–ROM, thus creating the technical capability to undertake such tasks in the future. National Science Standards–based lessons on the CD are coupled with interactive, multimedia exercises to develop in teachers and students an appreciation of the role NASA's Earth Science Enterprise plays in our understanding of global climate change.

A direct spinoff from the research started with Project eSS has been the establishment of a Scientific Visualization Laboratory at Norfolk State headed by Dr. Waldo Rodriguez, one of the scientists on the project. He has since been funded for additional research in using visualization techniques to study the spatial and temporal dynamics of stratospheric aerosols, water vapor, and ozone.

Norfolk State University
Project eSS—NASA/Norfolk State University Cooperative Agreement for Research and Curriculum Development in Earth System Science

Other Teaching Programs

Norfolk State University
Project eSS—NASA/Norfolk State University
Cooperative Agreement for Research and
Curriculum Development in Earth System Science

Project eSS has also spawned summer workshops and internships at Norfolk State funded by NASA through the Earth Science Enterprise. A weeklong teacher workshop and a 6-week undergraduate research program in Earth system science have each been funded for 3 years.

Partnerships

Working relationships have been established with many local school districts that have high percentages of disadvantaged students. These include Suffolk, Norfolk, Portsmouth, Hampton, Newport News, and Chesapeake. The appropriate administrator in each school district has cooperated in our field-test efforts on Project eSS and offered support letters for other proposals written.

University partnerships have been established with the Center for Coastal Physical Oceanography at Old Dominion University, the MU-SPIN Network Regional Training Center at Elizabeth City State University (Linda Hayden), the Center for Learning Technologies in Urban Schools at Northwestern University, the Center for Innovative Learning Technologies (University of California at Berkeley), and the Physics Education Research Group at Kansas State University.

Salish Kootenai College
Alliance for Minority Partnerships and Rural Systemic Initiative

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Overview

Salish Kootenai College is developing preservice and inservice teaching activities addressing areas specific to NASA's Aero-Space Technology Enterprise and Dryden Flight Research Center. The intention of the activities is to integrate historical Native American knowledge and practices in navigation and weather with NASA's knowledge and technology in weather and navigation. The expected outcomes are:

- Provide a curriculum relevant to Native American students that will foster interest in math and science
- Provide a curriculum for all students that will enhance their knowledge of Native American cultures

Currently most NASA research is a totally alien concept to most tribal communities. For Native American students to believe they can be successful in space science areas, early exposure is necessary.

Six teams of teachers from five sites and four Native American students in their third or fourth year of elementary or math/science/technology teaching majors have been involved in the planning and writing of the teaching lessons. Tribal elders were sources of much of the Native American content. The teams are from Chief Leschi School, Tacoma, Washington; Pine Ridge Reservation, South Dakota; Fond du Lac Reservation, Minnesota; Ft. Peck Reservation, Montana; and Flathead Reservation (two teams), Montana.

Outcomes

From September through February 1998, teachers participating in the program piloted teaching lessons developed the previous summer. In February, the teachers met and reviewed the results. Although favorable, they learned a lot from the experience. (None of the teachers had previously written materials, which would be used by others.) At this meeting, they planned a 10-day working session at Dryden in early June. It was felt that the knowledge gained through the first "shakedown" readied them to do some serious writing. It was felt that they needed a uniform lesson format and a uniform evaluation. It was also decided that the teachers were confident enough with their product that they would like their materials to be tried by other teachers during the pilot testing in 1998–99.

Other Teaching Programs

Salish Kootenai College Alliance for Minority Partnerships and Rural Systemic Initiative

In June, staff, teacher teams, tribal elders, students, and two advisory committee members met at Dryden for 10 days. One hundred fifty standards–based teaching lessons (K–12 were produced. The group followed its uniform format and NASA publication specifications. Staff, in preparation for the trial draft, then edited the lessons.

In August, a 3-day revision session was held at Chief Leschi Tribal School in Tacoma, Washington. The lessons were revised, and some additional ones were produced. In all, the project now has 170 teaching lessons, which are being piloted, at the various sites, not only by the teachers, but also by some of their colleagues. The draft materials have been shown and discussed at meetings, inservices, and conferences. There is high interest in the materials, and it is hard to tell teachers that they will have to wait for the materials' availability. Some selected sites have agreed to have teachers pilot some of the materials, which will be valuable at the time of the revision for the final draft in June 1999.

Partnerships

In addition to the partnerships between the team sites and their schools, Salish Kootenai's Alliance for Minority Partnership and Rural Systemic Initiative programs have worked closely together with the NASA project. The Alliance for Minority Partnership program provided an entry to the sites and cosponsored college students with NASA. The Rural Systemic Initiative program recruited the local teachers (Flathead Reservation, Montana) from their pool of math/science/elementary teachers with whom they work. Penn State University provided a network class on lesson writing, and several of the teachers took advantage of the class for up to 6 credits.

Society for the Advancement of Chicanos and Native Americans in Science SACNAS K–12 Teacher Workshops

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Overview

The objective of the Society for Advancement of Chicanos and Native Americans in Science (SACNAS) K–12 Teacher Workshops is to provide precollege teachers with the resources and the knowledge base needed to cultivate in their students a lasting interest in science. The concept for the 1998 project was based on a highly orchestrated, collaborative effort between SACNAS and established scientific agencies—namely, NASA, the American Society for Microbiology, and the National Research Council. Representatives from these agencies would involve the teachers in hands-on, inquiry-based investigations, which could be easily modeled and implemented in their own classrooms.

Enrollment Data

One hundred precollege teachers from across the country were competitively selected to participate in the 1998 Teacher Workshops. They came from 21 States, including educators from the Native Alaskan, Native American, and Native Hawaiian communities. There was an even proportion of elementary, middle, and high school educators. A few key administrators were also included. The group of teachers involved in the 1998 Teacher Workshops was composed of Hispanic, African-American, Native American, Asian-American, and Anglo educators.

SACNAS invited a special guest speaker primarily for the teachers. George "Pinky" Nelson, Ph.D., is a former Space Shuttle astronaut who now directs Project 2061 of the American Association for the Advancement of Science. Two special presenters who were formerly affiliated with the organization Teach for America gave an interactive presentation aimed at improving teacher lesson plans. On Sunday morning, SACNAS scheduled a fundraising workshop for the teachers.

Outcomes

The sessions ran like clockwork, in part because of the level of communication and planning among all involved. Hence, the limited time was used optimally; teachers had sufficient time to work through several hands-on exercises and still receive materials and resource information from the agencies. All the agencies came well prepared with materials for all of the teachers, and their presentations were polished. The teachers were very

Society for the Advancement of Chicanos and Native Americans in Science
SACNAS K–12 Teacher Workshops

engaged in all workshop sessions, demonstrating an eagerness to learn new, inquiry-based methods of science instruction.

A highlight for the teachers was the NASA tour of Goddard Space Flight Center in Greenbelt, Maryland. At the center, the teachers attended a brief, informative presentation, toured the Center, received hands-on instruction according to their respective classroom level, and received NASA educational resources.

The teachers were encouraged to explore the other conference activities when their schedules permitted. Many teachers were able to meet students and scientists who came from their same geographical area.

Teachers submitted written reviews of their experience at the Teacher Workshops. These reviews indicate that the teachers found the activities to be particularly interesting and relevant, either for the instructional concepts or for the resources, which were disseminated.

SACNAS will be following up with the teachers who participated in the workshops over the next few months in an attempt at gauging the long-term success of the program. It will be helpful to know whether they have been able to implement what they learned. This will be critical in developing the program.

Partnerships

The quality of the 1998 project relied on partnerships with the three following agencies: NASA, the American Society for Microbiology, and the National Research Council. NASA has provided the key support for SACNAS's K–12 component for some time. This year, NASA expanded its role. As the key partner, NASA provided the majority of the fiscal support, hosted the teachers on a tour of Goddard Space Flight Center, and directed a workshop for the teachers.

The American Society for Microbiology conducted an informative hands-on workshop. This session was a condensed version of the society's very successful Microbial Discovery Workshop.

The National Research Council held a large morning session based on "fast plants." The teachers broke into three groups for the afternoon session. These sessions were focused on accessing resources for the teachers. The teachers gave these sessions high marks.

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University of the District of Columbia Scientific Renewal Program

Overview

The University of the District of Columbia (UDC) Scientific Renewal Program is a 3-week summer workshop for (primarily) elementary school teachers from District of Columbia Public Schools (DCPS). Funded since 1991, the program is designed to improve mathematics, science, and technology education for DCPS students. As is the case with other urban school districts, DCPS is characterized by:

- A shortage of teachers having majors or course concentrations in math and science
- A student population whose interest in science declines as the students progress from kindergarten through the 12th grade
- Standardized test scores that are below the national average
- Recognition that effective instruction must take into account cultural and individual differences in learning style preferences

In an effort to improve mathematics, science, and technology instruction within District elementary schools, the Scientific Renewal Program seeks to address the above conditions by:

- Exposing participating teachers to courses in nonnumerical mathematics, physical science, and computer programming, as well as a 1-week workshop involving the use of multicultural approaches to mathematics, science, and technology instruction
- Providing opportunities for participants to learn and practice using an experiential discovery approach and simple demonstrations to teach mathematics, science, and technology concepts and principles
- Providing instructional materials and kits that can be used to give students concrete "hands-on" experience with abstract scientific principles covered in their classroom instruction

Enrollment Data

Program participants are elementary teachers, the majority of whom are assigned to fourth through sixth grade classes from which students are recruited for UDC's elementary student programs. By attracting teachers from these grades, the program provides a mechanism for strengthening student recruitment, expanding the impact of its approach throughout DCPS, and increasing the likelihood that the approach to which program teachers are exposed during the summer will be appropriate for use with the students they teach during the academic year.

Other Teaching Programs

University of the District of Columbia Scientific Renewal Program

The recruiting problems caused by program funding reductions in 1997 were exacerbated in 1998 by the huge demand for teachers to handle the significant increases in summer school enrollment. With DCPS paying salaries that were nearly triple the program stipend, most prospective participants opted to accept summer teaching positions.

Outcomes

Recent program participants have, for the most part, been recruited from schools that needed an additional member to create the three-person program teams that have been associated with improved mathematics, science, and technology instruction in the past. As a result, analyses of records and survey and interview data reveal that the Scientific Renewal Program continues to accomplish its outcome objectives. Specifically, the program has:

- Increased participants' mastery of math, science, and technology course content and skills
- Increased participating teachers' proficiency in using mathematics, science, and technology pedagogical approaches with demonstrated effectiveness in raising the mathematics, science, and technology achievement of students in systems similar to those found within DCPS
- Enabled teachers to increase their students' interest in math, science, and technology, as measured by participation in competitions, enrollment in mathematics, science, and technology enrichment programs, and more frequent requests for mathematics-, science-, and technology-oriented field trips, Internet projects, and guest speakers
- Increased the percentage of students who satisfactorily complete the objectives in mathematics, science, and technology instructional plans based on the teachers' Scientific Renewal Program experiences

Partnerships

During the development and implementation of program, UDC's Science and Engineering Center has partnered with the National Urban Coalition, which has provided training to help participants use multicultural approaches to develop interest and improve performance among students from diverse cultures with distinct learning style preferences. The experiences of Scientific Renewal Program teachers have been used to refine and expand the teaching approach in "Say Yes" programs operated by the National Urban Coalition throughout the United States, as well as in a growing number of family-centered mathematics, science, and technology learning environments.

MASTAP Programs

Bennett College
MASTAP

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Overview

The purposes of the NASA MASTAP Resource Center are to:

- Enhance the Bennett College mathematics and science education programs through strengthening technology
- Provide preservice training designed to motivate prospective teachers to become mathematics, science, or technology teachers, and enhance the teaching ability of persons engaged in the teaching of mathematics, science, and technology through summer institutes and workshops
- Provide curriculum materials and equipment designed to enhance the training of prospective teachers, and provide additional training to inservice teachers of mathematics, science, and technology to teach children with physical, mental, visual, and/or auditory challenges
- Provide resources and instruction to improve the teaching and learning environment of ethnic minorities

The center is open 5 days a week and on Saturdays by appointment. The Bennett faculty, staff, and students are encouraged to use the center for special classes and meetings and to use the resources and equipment to supplement their curricula and assignments. In addition to computers with Internet access, the center houses curriculum guides and resource materials in science, mathematics, technology, learning styles, multicultural education, and special education for use by classroom teachers.

Enrollment Data

The target audiences for this project are middle and high school mathematics, science and special education teachers, and college students. Also included are teachers who teach ethnic minorities and students with special needs.

Preservice participants were recruited from a mass mailing to all community colleges, colleges, and universities in North Carolina. Inservice participants were recruited from a mass mailing to all middle and high schools in North Carolina. Inservice participants were also recruited at the North Carolina Council of Teachers of Mathematics conference and the North Carolina Science Teachers Association conference and State meeting, during Education Day activities, and by word of mouth.

MASTAP Programs

Bennett College MASTAP

Outcomes to Date

The NASA MASTAP project held more than 40 workshops, six field trips, and five seminars during the 1997–98 academic year. Student participants along with the coordinator presented a working booth at the annual North Carolina Science Teachers Association conference. The coordinator conducted several workshops for the Bennett College Children's House, Bluford Elementary School, Dudley High School, and Smith High School, as well as at the National Science Teachers Association conference. During the project year, inservice participants earned more than 33 contact hours in technology.

Participants who attended workshops and or seminars during the school year received a $50.00 stipend for each workshop they attended. Local middle and high school students were invited to participate in the Countdown to Launch satellite program. More than 350 students attended with nine teachers. The following workshops/activities were held during the year:

- Science Magic
- Math Strategies for the Classroom
- Infusing Technology in the Classroom
- Poster Contest
- Effective Use of Shareware in the Classroom
- Family Math
- CBL for Science Teachers
- CBL for Math Teachers
- Multicultural Education
- Strategies for the Hearing Impaired
- Math Games With Graphing Calculator
- Cultural Differences in the Classroom
- Education Symposium (College students from North Carolina were invited to attend a day of workshops and activities that pertained only to them.)
- Panel Discussion—The Effects of Social Justice on 21st Century Education
- Meeting the Needs of Children With Disabilities in the Regular Classroom
- Reading Recovery in the Regular Classroom
- I Want to Be Like Me—A Study in Ethnicity
- Science for the Middle School Curriculum
- Working With the Special Needs Child

MASTAP Programs

Bennett College
MASTAP

The NASA MASTAP Summer Institute was held from June 16 through July 3, 1998. The institute consisted of 10 preservice participants and 22 inservice participants. The preservice participants received a $500.00 stipend, and the inservice participants received a $1,000.00 stipend and qualified for 6.0 continuing education units. The following workshops/field trips were offered during the institute:

- I Can Hear You—Sign Language
- Computers in Education
- Integrating Reading in the Curriculum
- The Employment Process
- Discipline and Management
- Math Games
- Biology Magic
- Industries for the Blind
- Lights, Camera, Educate
- EPA—Hands on Air Quality
- Asheboro Zoo
- Math and Physics at Carrowinds
- Charlotte Hawkins Brown
- Natural Science Museum
- Fun With Chemistry
- Ocean Biology
- A New Plant for Teaching: C Ferns
- Overview to Biotechnology: DNA
- Earth Science: Plate Tectonics Field Test
- Working With Difficult Parents
- Native American Panel Discussion
- Polaroid Visual Learning
- Greensboro Historical Museum and Cultural Arts Center
- Discovery Place—Space Challenger
- Integrating Learning Styles in the Content Area

Partnering

The NASA MASTAP project at Bennett College has a strong partnership with the Guilford County Public Schools. The science and math supervisors and several teachers from Dudley and Smith High School serve on the Advisory Board. Many of the workshop presenters and Summer Institute participants have been teachers in the Guilford County Public Schools. There is also a strong working relationship with the Industries of the Blind. Presentations on the NASA MASTAP project were made at Florida A&M University and Shaw University.

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Florida International University Minorities Achieving Success in Teaching Mathematics & Science

Overview

The third year of the NASA-funded project Minorities Achieving Success in Teaching Mathematics & Science (MASTMS) at Florida International University has been at a faster pace of work and more productive than either of the other years. The program continued to focus on the five subprojects that constitute the program, but the third year was more concentrated on student experiences, support system development, and the research project. The numbers of underrepresented minority students in and completing the program are continuing to improve and stabilize. The majority of those who graduate were African-American and Hispanic students for the third consecutive year. This pattern of completion is considerably different from the pattern before the MASTMS project began. In addition, the involvement of the Miami-Dade County Public Schools in the preparation of secondary school mathematics and future science teachers increased as well, while the preparation of the students continued to be soundly based on the national reform movement and the State of Florida reform initiatives.

Recruitment Project

As the MASTMS project nears completion, the desired effects have been achieved. The enrollment of students seeking and fully admitted to programs for certification in mathematics and science is the greatest it has been in more than 10 years. The number of these fully admitted students who represent minority populations is currently in parity, approximately in proportion to the population of African Americans, Hispanics, and other minorities in the South Florida Region.

Scholarships have been provided for approximately 20 percent of these students who have been fully qualified academically for the requirements of NASA. These students are academically the strongest the program is graduating, and they are viewed as high-quality beginning teachers in the Miami-Dade County Public Schools.

MASTAP Programs

Florida International University
Minorities Achieving Success in Teaching Mathematics & Science

Student Retention & Teaching Experiences Project

Twenty of the future mathematics and science teachers participated in a 6-week summer teaching experience program. They served as coteachers and teaching assistants for 6 hours each day (totaling about 180 to 200 hours of teaching), as they participated in an intensive mathematics-, science-, and technology-integrated program for secondary school students. Master teachers from the Miami-Dade County Public Schools worked with them, as did university faculty and graduate students. Each was assigned to a teaching team consisting of a university faculty member, a Miami-Dade County Public Schools master teacher, and a graduate student. The undergraduates served as tutors, mentors, and coteachers on the team. This involved them in a study of reform curriculum, hands-on, minds-on classroom experiences, planning for instruction, and reflection on the outcomes of instruction. The intensive program included the building and launching of rockets and the study of their construction and path of travel on the part of the secondary school students.

The program continued the requirement of undergraduate students' participation in the on-campus, magnet-like school called Partnership in Academic Communities (PAC), which consists of about 100 secondary school students who are at-risk, underrepresented minority students from the Miami-Dade County Public Schools. Each undergraduate student in the required program courses donated about 5 hours per week to working in the program. The main purpose of these experiences was the interpretation of their university mathematics, science, and technology courses to appropriate uses with secondary school students.

Curriculum & Instruction Project

The third year provided several opportunities for strengthening and building the curriculum and instruction of the mathematics and science secondary school teacher preparation and certification programs. The faculty and teachers in the PAC program, together with selected graduate students, participated in a range of long-term workshops and institutes.

Three of the staff participated in weeklong institutes on the integration of Pacesetter Mathematics into the program. These faculty and staff are adopting and adapting this curriculum and instruction process to the undergraduate programs and to the PAC program. The staff who attended were provided extensive support in integrating graphing calculator technology—including being given classroom sets of graphing calculators for use in the MASTMS programs—and real, current-day applications of mathematics.

MASTAP Programs

Florida International University
Minorities Achieving Success in Teaching Mathematics & Science

Two faculty have participated—over a 2-year period with about 12 days of total training time—in a National Science Foundation project called MainSTey, funded to the Louisiana Collaborative and Southern University. The focus of these training and development sessions is on the integration of the Calculator-Based Laboratories (CBL) and the Calculator-Based Rangers (CBR) into the teaching of college mathematics and science.

The development of secondary school teachers' knowledge and skills in the use of technology and in support systems for future teachers has been a continuing and intensifying effort of the project. Related colloquia were held every 3 weeks from January through May 1998, and selected teachers were then supported in weeklong institutes during the early summer of 1998. This investment has yielded a support system for future mathematics and science teachers, as well as a core of teachers who are using technology and real applications in their teaching. In most of the classrooms, pure lecturing by the instructors has been replaced by an organic integration of instructors' presentations, students' hands-on investigations, small and large group discussions, cooperative learning, and other effective teaching strategies.

The instructors have become facilitators of students' learning rather than those who transmit information for students to receive. The new approaches to teaching mathematics—at least new to the cadre of teachers—will continue to provide the teacher trainees a perspective on teaching and learning that will allow them to be risk-takers, users of technology, and continued investigators of real and applied uses of mathematics in their teaching. These have been opportunities to see and use substantive and substantial mathematics and science, including those of the NASA operations.

Course and curriculum development has continued, with new and improved science courses and the integration of technology into more mathematics courses becoming a major focus. Courses for undergraduates that provided dual views of technology integration are currently standard in the considerably improved and standards-based mathematics and science curriculum that the MASTMS project has made possible.

Students experience the regular use of technology in many of their courses, and they also experience the teaching and tutoring of secondary school students in courses that also have strong technology integration. Thus, the theory of mathematics and science content, pedagogy, and philosophy are practiced in secondary school teaching situations, so that the future mathematics and science teachers see how the uses of technology are interpreted into actual curriculum and instruction in sound, standards-based mathematics and science courses.

MASTAP Programs

Florida International University
Minorities Achieving Success in Teaching Mathematics & Science

During the third year, project staff continued to make presentations, attend conferences, and organize or run workshops to gain and share ideas to facilitate curriculum development and instruction reform.

Research Project

A continuation and intensification of research occurred during the third year, which will continue beyond the final year of the MASTMS project. Concurrent with the new emphases, the teaching experiences phase of the project has led to a study of the effects of the increased participation of the more advanced students in opportunities to teach, tutor, and mentor secondary school students.

Preliminary observations indicate that the future mathematics and science teachers are benefiting greatly from the substantial teaching experiences. They report reinvigorated feelings of desire to teach and learn more about the psychology, pedagogy, and professionalism of teaching. Their learning and understandings, according to their reports and project observations, are increasing their effectiveness. They are developing more real and well-founded belief systems and are beginning to learn how to experiment in teaching and to move beyond the traditional telling and repetition approaches. The understanding of how beginning teachers develop their own ideas and what forces influence these ideas as they progress from minimal experience to constant and sustained experience under the support and direction of master teachers is a main focus of this phase of research. The project has been able to institutionalize this important phase of research through financial support to the future mathematics and science teachers. This allows for the more systematic setting of expectations, the collection of data, and the formulation of hypotheses.

A master's level thesis has been completed and reported. Under way are two more thesis studies, the pilot investigation for a doctoral study, and several faculty studies. The concentration of most of these studies is on the geometric thought development as it is influenced by explorations using technology. The computer software for investigation and problem solving is proving to be a tool that allows secondary and college students to develop hypotheses, test those hypotheses, and see how the hypotheses can be verified or proven as a cycle of thinking that supports both mathematics and science. The project's pattern of studies is creating valuable computer-based curriculum, including dynamic geometry investigation materials, which are unique and providing opportunities for new directions in reasoning and thought development. During 1997–98, reports of these studies were given at conferences and conventions.

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Shaw University Mathematics, Science, and Technology Awards for Teacher and Curriculum Enhancement Program (MASTAP)

Overview

The Shaw University MASTAP project helps accomplish the national educational goals (Educate America: Goals 2000 Act). It establishes an exemplary teacher preparation model that includes curriculum enhancement, collaboration between the university and local school districts, and financial assistance for students. All respondents from participating school districts and university participants (1997–98) indicated that the model is appropriate for recruiting and training math and science teachers to work in the difficult-to-staff schools.

The project also helps increase the public's awareness of current educational needs. During the 3-year cycle of the project, the number of minority teachers employed in math and science (North Carolina) increased by 2 to 3 percentage points. Furthermore, the Shaw University MASTAP model enhances the preservice teacher's knowledge of teaching, expands professional development opportunities for inservice teachers, and contributes to the math and science literacy of public school children.

The success of any new program strongly depends on marketing, publicity, visibility, and public familiarity. During the last year of the Shaw University MASTAP project, the public school systems, community colleges, neighboring universities, and communities incorporated the project into their resource bank describing available services.

During the 1997–98 term, the number of persons initiating contact with the MASTAP office (first time) increased by 22 percent over that of the previous year (at least 52 contacts). Inquiries for more information regarding scholarship opportunities or in response to advertised seminars or related events made up the majority of the contacts. On November 19, 1997, WLFL Fox 22 TV News featured the October MASTAP partnership activity involving several partners and university officials. The April 24, 1998, conference addressing minority testing issues also received television coverage. During the first week of school (August 1998), the principal investigator was featured on an NBC 17 TV show addressing education issues.

MASTAP Programs

Shaw University
Mathematics, Science, and Technology Awards for Teacher and Curriculum Enhancement Program (MASTAP)

Enrollment Data

Since the 1996–97 evaluation report, an additional five students enrolled in the Shaw University MASTAP program, making a total of 24 participants. A total of 67 percent of all scholars made the decision to become math or science teachers because they needed additional funds to support their educational training. About 75 percent of these scholars are 20 years of age or older, and 58 percent are from North Carolina. These students have a mean grade point average of 3.18. Six students completed the program; five of these are teaching in difficult-to-staff schools, and one is pending an assignment to such a school. Eighteen students are awaiting program completion (two are inactive).

Outcomes

During the third year of the Shaw University MASTAP project, significant accomplishments were made in all areas of the project. The scholars initiated many recruitment activities and regularly distributed literature and responded to questions regarding the project, including:

Objective: To recruit and retain prospective mathematics and science teachers, and to produce certified math and science teachers

- The project enrolled five additional students (3-year total of 24 scholars).
- Six students are teaching in difficult-to-staff schools, and 18 students are pending program completion.

Objective: To review and revise the mathematics and science curricula

- More than 90 education students, including scholars, completed field experiences in LEA's having more than 50-percent overall minority population.
- There was a curriculum review of compliance with latest National Council of Teachers of Math and the National Science Teachers Association standards.
- A new course in Earth science (Project NOVA) was planned and designed.
- There was expanded use of critical thinking and problem-solving activities.
- There were 20 ongoing seminars, with 119 students participating in these seminars.
- A statewide conference examined student performance on standardized testing at the K–12 level and beyond, with about 50 teachers and administrators from across the State participating.
- Two hundred copies of proceedings were distributed to State and national education leaders.

MASTAP Programs

Shaw University Mathematics, Science, and Technology Awards for Teacher and Curriculum Enhancement Program (MASTAP)

Partnerships

The Shaw University MASTAP is a partnership involving 20 North Carolina school districts with a minority student enrollment that approximates 50 percent or more of the overall population. During the third year of the project, 100 percent of these schools participated in at least one MASTAP activity—that is, hosted a site visit, received field students, referred students, attended a project activity, made suggestions, assisted with student training, and so forth. At least five of the scholars completed internships with extended partners or related corporations, industry, and other universities.

University of North Carolina at Pembroke Minorities In Science and Mathematics Education Program (MISME)

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Overview

The MISME program was especially designed to enrich the preservice teacher training programs as described below. Because of MISME, the teacher education program at the University of North Carolina at Pembroke has been able to increase the number and strengthen the skills and knowledge of underrepresented minority science and mathematics preservice teachers prepared and licensed to teach in secondary schools that have substantial enrollments of minorities. The MISME program at UNCP involved the following set of action steps:

- Implement a new student recruitment plan
- Establish a mentor/advisor team for each student in the program
- Conduct intensive summer science/math enrichment programs on and off campus
- Provide for off-campus field trip experiences during the academic year
- Establish and implement a new pedagogical model, a professional opportunity seminar series, and a preservice teacher tutorial assistance program
- Establish a strong, dynamic partnership between the university and local secondary schools

The MISME program committee assigned a Mentor-Advisor Team (MAT) to each student participating in the program. The team consists of two faculty members—one being a mentor with the appropriate academic background and the other being an advisor having secondary science education credentials. The MAT met with the student at least once a week throughout the student's entire program and helped address any cognitive, social, or emotional problems the student might be experiencing at that time. Specific mentor responsibilities included (but were not limited to) acting as an academic advisor, monitoring the student's academic progress, providing regularly scheduled counseling sessions, assisting in the planning and implementation of field trip experiences and other travel, and apprising the student of professional opportunities.

The MISME program conducted the Professional Opportunities Seminar Series for all students participating in the program. The seminar format provided an arena for an intellectual exchange of ideas and information followed by a "social" where a more informal exchange occurred between the presenter and MISME preser-

University of North Carolina at Pembroke
Minorities In Science and Mathematics Education Program (MISME)

vice teachers. MISME also established a Pre-service Teacher Tutorial Assistance Program in Science and Mathematics (P-STTAP) for local secondary school students. As part of the MISME pedagogical model described earlier, the MISME preservice students were assigned to a local secondary school to establish a "Team Teaching Partnership" with an inservice science or mathematics teacher. The partnership begins sometime during the preservice teacher's first semester and continues until the end of the program. As part of the model, the preservice teachers were required to complete a certain number of hours of early field experiences (well above the minimum number of hours required by the existing teacher education program at the University of North Carolina at Pembroke) that engaged them in a variety of activities.

Enrollment Data

The MISME program began with an enrollment of 15 students. Ten were Native American, four were African American, one was Hispanic. The group had 10 females and five males.

Accomplishments and Student Achievements

Of this original group, three have graduated and have passed North Carolina's teaching test. Three others have graduated and will soon take the North Carolina teaching test. Another three will graduate and take the test at the end of the academic year (1997–98); one student graduated and enrolled in a Ph.D. program in mathematics at Indiana University. Five students either changed majors or dropped out of school.

PAIR Awards

Partnership Awards for the Integration of Research into Mathematics, Science, Engineering and Technology Undergraduate Education (PAIR)

NASA's PAIR Awards are designed to provide minority institutions with an opportunity to build on their NASA-sponsored research and their rich history of educational excellence. This is done by creating partnerships between the NASA-sponsored researcher at the minority institution and the math, science, engineering, and technology (MSET) academic programs at the institution and between the minority institution and NASA Centers or the Jet Propulsion Laboratory (JPL). Partnerships are also created with other institutions of higher education and the aerospace community having substantial involvement in NASA's mission, which strengthens the MSET academic infrastructure of the HBCU/MI. The PAIR award objectives are to:

- Produce more competitive undergraduate students who, because of their research training and exposure to cutting-edge technologies, are better prepared to enter MSET graduate programs or MSET employment in NASA-related fields
- Increase participation of faculty and students in NASA-related projects that both foster collaborative inquiry and promote broad and significant improvements to undergraduate teaching and research training
- Establish replicative models of HBCU's and OMU's that successfully use NASA-related research and the results of its mission to enhance the content of MSET undergraduate curriculum and thereby expose greater numbers of students and faculty to cutting-edge science and technology concepts and practices

There are a total of seven PAIR Awards at the following universities:

- City College of New York–City University of New York
- Clark Atlanta University
- Hampton University
- North Carolina A&T State University
- Tuskegee University
- University of New Mexico
- University of Puerto Rico at Mayagüez

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City College of New York–City University of New York
Remote Sensing and Environmental/ Climate Research

Overview

The NASA Partnership Award will link New York City and Medgar Evers and Hunter Colleges of the City University of New York (CUNY) with the Goddard Institute for Space Studies (GISS) in a collaborative, multidisciplinary effort to integrate ongoing NASA research at these colleges and GISS with MSET course curricula and research training. The partnership will produce a combined research/teaching program with greatly broadened relevance and appeal across the full extent of the undergraduate MSET curriculum. The organizing theme of the proposed initiative will be Remote Sensing and Environmental/Climate Research. This theme reflects ongoing research in NASA grants—two at City College of New York (CCNY) in the School of Engineering and one each at Medgar Evers and Hunter Colleges—and builds on past student-focused collaborations between them and GISS.

The centerpiece of the proposed initiative will be a multidisciplinary undergraduate core program combining research training and teaching in the School of Engineering at CCNY. It will be based on a framework of interrelated ongoing NASA research activities at CCNY, GISS, and other CUNY units. From this central core, the program will reach out of the School of Engineering and interconnect, using specially tailored research/teaching modules, with other related MSET courses ranging from freshman to senior level at CCNY and the other two CUNY colleges, plus Bronx and LaGuardia Community Colleges, which feed students to the senior colleges.

With its broadly appealing theme, the proposed core program in the School of Engineering will readily attract many engineering students and provide them with an educational experience of both depth and breadth. It combines research components integrated with specially developed sets of multidisciplinary course sequences. These sequences will be developed to comprise significant subsets or minors in the engineering department baccalaureate curricula in the School of Engineering, which with 2,507 undergraduates has one of the largest enrollments in New York. These minors will in turn serve as precursors to related master's programs to be developed in the future within the Graduate Division.

City College of New York–City University of New York
Remote Sensing and Environmental/
Climate Research

Outcomes, Goals, and Objectives

Specific outcomes to be achieved by the end of the period of performance:

- An effective partnership among CCNY, Medgar Evers and Hunter Colleges, Bronx and LaGuardia Community Colleges, and NASA GISS to integrate, on an ongoing basis
- NASA research at these institutions with undergraduate MSET curricula and research training in the area of remote sensing

To involve undergraduate students in research related to this area of science requires an academic program of study that has as its focus the study of Earth systems science and the technology that fuels its existence. Earth's components—geosphere, hydrosphere, atmosphere, and biosphere—when studied as an integrated system, provide the scientific foundation needed by students to analyze measurements obtained from a remote platform. At Clark Atlanta University, the opportunity exists to engage in meaningful research related to NASA and Earth systems science; the challenge, however, is in providing cohorts of students the needed scientific background rather than providing this foundation on an individual basis to each student participating in research. Because the former solution is the preferred, Clark Atlanta University conceived, designed and adopted the Earth systems science program.

The principal goal of the Earth systems science program at Clark Atlanta is to enhance the ability of students—all students—to think and solve problems that cross academic disciplines while they hone their understanding of the interaction among the components of Earth's system. In pursuing this goal, Clark Atlanta University will, simultaneously, increase the number of minority students that were prepared to pursue graduate degrees and lifetime careers in areas related to Earth systems science.

The goal of the proposed PAIR builds on that of the Earth systems science program. The PAIR will provide undergraduate students with the knowledge and skill base needed to actively participate in research involving remotely sensed measurements of the atmosphere. This goal will be achieved through the accomplishment of program elements having defined outcomes that address the following six objectives:

- *Objective 1:* To teach instructors how to design, organize and deliver the content of Earth systems science using experiential teaching, which has as a tenet that what a student learns depends a great deal on how a student learns

City College of New York–City University of New York
Remote Sensing and Environmental/ Climate Research

- *Objective 2:* To modify existing physics, mathematics, statistics, computer science, chemistry, and Earth systems science courses—introductory and capstone levels—by including a case or field study that employs remotely sensed measurements of Earth' components
- *Objective 3:* To develop six new courses that will complement the existing course offerings in Earth systems science in the areas of atmospheric chemistry, active remote sensing, micrometeorology, instrumentation electronics, atmospheric aerosols, and radiative transfer and passive remote sensing
- *Objective 4:* To use technology as a mechanism to complement, reinforce, and extend students' understanding of Earth systems science concepts
- *Objective 5:* To demonstrate and document the enhanced motivation and academic success of students through a rigorous assessment of classroom materials, pedagogy, and student learning
- *Objective 6:* To disseminate the PAIR framework to other institutions of similar mission and to serve as peer mentors for their faculty

Clark Atlanta University Integration of Research and Education in the Area of Earth Systems Science

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In 1988, Clark College, an undergraduate liberal arts institution, and Atlanta University, a graduate institution, consolidated to form Clark Atlanta University. As part of the plan for consolidation, the newly formed university developed a plan of action to create "A University for a New Day." In developing this action plan, it was recognized that new academic and research directions must be established to prepare students and faculty to meet the challenges of the technologically driven world of today and the future. It was further recognized that future challenges would require students to solve problems that cross academic disciplines. Because traditional, single-discipline programs formed the basis of the university's structure, it was decided that the core curriculum for undergraduates must include courses that allow students to critically think across academic disciplines and to apply classroom knowledge to the interpretation and solution of "real-world" situations. With this as an impetus, the program in Earth systems science was conceived, developed, and adopted.

Earth systems science is the interdisciplinary study of the interconnected components of Planet Earth. The components are land (geosphere), water (hydrosphere and cryosphere), air (atmosphere), and life (biosphere). The goal of Earth systems science education at Clark Atlanta is to develop in students an understanding of Earth's systems, using the tools and concepts of the systems scientist. The study of Earth's system, therefore, crosses all disciplines, in particular those of physics, mathematics, chemistry, biology, computer science, engineering, education, political science, and business.

The Earth systems science program within the Department of Physics at Clark Atlanta University was initiated in 1993 through funding provided by the AT&T Foundation and the National Oceanic and Atmospheric Administration (NOAA). This program has as its overall aim the eventual establishment of an Earth systems science undergraduate and graduate concentration at the university through the development of a comprehensive curriculum, research, and an outreach program in this area. The first phase of the program's aim was achieved in September 1995 when the academic council at Clark Atlanta approved the establishment of an undergraduate concentration in Earth systems science.

PAIR Awards

Clark Atlanta University
Integration of Research and Education in the Area of Earth Systems Science

Clark Atlanta University has also embarked on an institutionwide agenda to reform its academic structure. This reformed agenda will enhance the knowledge base, depth of understanding, and retention of all students. The agenda has as a cornerstone the development of a 10-year academic strategic plan that will provide students with classroom experiences to help them better understand why the information presented to them is important and how it can be used in other disciplines and in areas of their lives. The Earth systems science program has served as a prototype model of this plan. The proposed PAIR will continue to advance the university's strategic agenda through further development of the educational component of the Earth systems science program. This development will build on research being conducted as part of an existing NASA Faculty Research Award in the area of analysis and interpretation of remotely sensed measurements of the atmosphere.

Hampton University Center for Lidar and Atmospheric Sciences Students

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The Department of Physics at Hampton University and the NASA Langley Research Center propose to establish the Center for Lidar and Atmospheric Sciences Students (CLASS), an undergraduate research laboratory. The goals of CLASS are to increase the production of U.S. students who are underrepresented in science, to provide education and training in NASA-related fields, and to encourage and support these students in attaining advanced degrees. The center will allow students to participate in research teams in a student-run research laboratory environment that mimics the operation of research teams at a NASA field installation. The educational goal is to develop an instructional program that integrates the education curriculum with research training using the autonomous nature of a student-run research center as a motivational tool.

Conceptually, CLASS would be modeled after an advanced undergraduate-level NASA space camp with a remote-sensing and atmospheric sciences research emphasis. Students would design, build, maintain, and utilize low-power, eye-safe, and laser-based remote sensors to measure atmospheric aerosols, pollutant plumes, and clouds.

Center members will propose, design, and build NASA-related undergraduate remote-sensing projects under the guidance of a graduate student, faculty, and a CLASS Advisory Board consisting of Hampton faculty, NASA scientists, and ITT engineers. CLASS would draw on the significant scientific and technical capabilities of the Research Center for Optical Physics and the Center for Atmospheric Sciences at Hampton University and the Remote Sensing Branch at NASA's Langley Research Center. The responsibilities of the student research team would include:

- Proposing remote-sensing experiments to the CLASS Advisory Board
- Designing, fabricating, and testing lidar instrumentation for the experiments in conjunction with the Advisory Board, NASA Langley, and the industrial partner (ITT)
- Conducting campus-based and field-based experiments
- Archiving and analyzing data using a Silicon Graphics workstation and other computers provided by the Department of Physics
- Disseminating results through undergraduate and professional research journals and conferences

PAIR Awards

Hampton University
Center for Lidar and Atmospheric Sciences
Students

- Conducting K–12 outreach through science demonstrations, presentations, joint experiments, and web-based distance learning

The students, drawn from mathematics, physics, engineering, computer science, and chemistry, would take new, specialized remote-sensing and atmospheric science courses offered in the Department of Physics as technical electives. The students would also conduct a yearly research forum and author a capstone senior thesis and lecture as part of the program.

North Carolina A&T State University Integration of NASA Research Into Undergraduate Education in Math, Science, Engineering and Technology

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This proposal presents a 5-year plan for incorporating NASA-sponsored research into the undergraduate environment at North Carolina A&T State University. This plan will significantly improve undergraduate education in MSET by directly benefiting from the experiences of NASA Centers, affiliated industrial partners, and academic institutions. This proposal outlines three basic goals, along with specific evaluation criteria that can be used to measure the incremental success of each goal. The goals are to:

- Enhance core courses in the MSET curriculum through the development of portable learning modules, inspired by NASA- sponsored research.
- Upgrade core engineering laboratories to complement upgraded MSET curriculum and its appropriate teaching modules, and develop new undergraduate laboratory for a multi-disciplinary dynamic system and instrumentation
- Conduct research training for undergraduates in MSET disciplines through a sophomore shadow program with interaction among teaching and research faculty and through Research Experience for Undergraduates programs

A significant part of the NASA PAIR program is the involvement of NASA Centers such as Glenn (formerly Lewis) Research Center and Langley Research Center, industrial partners such as Boeing and Lockheed Martin, and educational institutions such as the University of North Carolina at Pembroke, Virginia Tech, and Atlanta University Center. Currently, North Carolina A&T State University has ongoing interactions with these institutions, and the effort proposed herein will broaden these activities. NASA Centers and industrial partners are expected to provide expertise in the form of lectures, technical consultations, and technology exchanges. The direct beneficiaries of the PAIR program will be the students at North Carolina A&T State University, the University of North Carolina at Pembroke, and Atlanta University Center. In these underrepresented educational institutions, existing laboratories will be modernized, new laboratories will be developed, sophomore shadow programs will be enhanced and developed, laboratory and teaching modules will be developed and tested, and the core MSET courses will be reformed and updated.

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Tuskegee University
Integration of NASA Related Environmental Research into Engineering & Science Undergraduate Training

This proposal is aimed at building on Tuskegee University's existing research project at NASA's Kennedy Space Center on the contaminant chemistry of hydrazine propellants and remediation technology development for propellant-contaminated NASA scrubber wastewater. The goal is to create an educational partnership among the engineering and science undergraduate programs at Tuskegee University, the NASA-sponsored researcher, Kennedy Space Center, Goddard Space Flight Center, the Jet Propulsion Laboratory (JPL) and two other HBCU's with which Tuskegee University has engineering training arrangements.

The major objective of this project is to significantly increase the production of competitively trained minority graduates with superior competence in NASA-related MSET disciplines through research-enhanced curriculum delivery. This will include the development of laboratory classes, which will incorporate research studies into newly designed or redesigned courses of instruction in environmental science and engineering with emphasis on the above-stated NASA-related undergraduate research training areas. Some of the other project activities planned include:

- Implementation and expansion of the new undergraduate degree option in environmental engineering and science to provide a greater depth of understanding in laboratory exercises and research methods as an integral part of two core courses of instruction
- Development of research training programs for undergraduate students during the regular academic year and in collaboration with partner institutions during the summer months
- Provision of support for the enhancement of engineering recruitment and retention activities through summer research internships for undergraduate students in engineering and science (fostered through the partnership with the two other minority colleges with which Tuskegee has undergraduate engineering training arrangements)

The expected outcomes of this project are as follows:

- Produce minority MSET graduates with a competitive edge in NASA-related disciplines and in the various areas of MSET
- Produce MSET graduates with the background to pursue advanced studies in NASA-related and other MSET areas

PAIR Awards

Tuskegee University
Integration of NASA Related Environmental Research into Engineering & Science Undergraduate Training

- Increase the number of minority students graduating in engineering and science
- Increase the awareness of minority students in the excellent career prospects in NASA-related technological areas
- Increase the participation of faculty and students in NASA-related research projects
- Enhance the technical content of the university's course offerings with research emphasis
- Produce graduates with analytical and self-study skills

The proposed funding for this program is as follows:

Year 1	$499,839
Year 2	$499.839
Year 3	$499,900
Year 4	$499,900
Year 5	$499,900
Total (5 years)	$2,499,378

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University of New Mexico
Preparation of University Research for Students in Undergraduate Education (PURSUE)

PURSUE presents a collaborative approach to improving the attraction, retention, and graduation of students in the areas of engineering, mathematics, computer science, and the sciences. Partners include the University of New Mexico's School of Engineering and College of Arts and Sciences, industry, and other educational institutions (TVI, Southwestern Indian Polytechnic Institute, and New Mexico Highlands University). Using widely successful examples, PURSUE will maximize successes and develop new interactions among all the partners: the NASA-ACE model for integrating research into undergraduate education, the NASA Training Project for providing support to students that results in higher achievement and retention, and NASA-related research (which now totals $7.3 million at the University of New Mexico) for bridging the gap between education and application for students at the University of New Mexico and at partner educational institutions.

PURSUE will become a national model by promoting and supporting undergraduate student involvement in active research and cutting-edge NASA-related research through mentoring, apprenticeship, and summer internship programs led by pregraduate and doctoral students and supervised by faculty, scientists, and researchers from NASA and collaborating industry partners such as the Jet Propulsion Laboratory (JPL). In addition, PURSUE will touch hundreds of other students within MSET and non-MSET majors through curricular developments; the major target for non-MSET majors will be those studying to be tomorrow's K–12 science and math teachers—an audience that will have a tremendous societal effect. Specific outcomes to be achieved by the end of the period of performance are as follows:

- Three hundred MSET students will have hands-on participation in NASA-related research projects and will have experience in writing research proposals, publications, and presentations.
- One thousand MSET students will achieve an improved awareness and understanding of NASA-related research through curricular changes and developments.
- Two thousand eight hundred non-MSET majors, especially aspiring K–8 teachers, will benefit from curricular enhancement.
- Five new undergraduate courses that integrate research will be created at the University of New Mexico.

PAIR Awards

- Fifteen courses will be implemented for the three educational partners of the University of New Mexico.
- Twenty-five seminars, lectures, workshops, or presentations will be presented to area high schools and 2-year colleges by PURSUE students.
- Twenty-five high school faculty will participate in PURSUE research projects.

University of New Mexico
Preparation of University Research for Students in Undergraduate Education (PURSUE)

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University of Puerto Rico at Mayagüez Partnership for Spatial and Computational Research (PaSCoR)

This partnership proposal aims to facilitate, enhance, and strengthen the undergraduate research and education programs in MSET. More specifically, the major components will be mathematics, electrical and computer engineering, geology, and agricultural sciences. The general topics will be in the study and use of remote sensing: algorithm development and applications with the idea of creating a certificate program in remote sensing.

Collaborations will be in the form of seminars, lectures, and summer research internships at several universities and NASA Centers. In addition, PaSCoR will be strongly supported by the Tropical Center for Earth and Space Studies located at the University of Puerto Rico at Mayagüez. This center has access to industrial partners, such as Raytheon, and other individual projects and laboratories on the Mayagüez campus. PaSCoR will provide the most critical experience for enhancing student motivation and qualifications for pursuing graduate studies, which is participation in research projects. PaSCoR will specifically further the objectives of NASA's Earth Science Enterprise. Throughout the collaboration with the Tropical Center for Earth and Space Studies and its satellite downlinks, data will be provided that can extend our knowledge of Earth system changes in the Caribbean and their applications on the global scale. The development of tools for data analysis, visualization, and animation will provide better, faster, and cheaper alternatives for the exploration of Earth and its applications to various fields.

An undergraduate Certificate Program, consisting of 12 credit hours in the area of remote sensing, GIS, and GPS and 6 credit hours of undergraduate research, will be developed. A total of 125 students are expected to benefit from this program. Based on previous experience, more than 50 percent of these students will pursue a master of science degree.

National Hispanic University Learning Innovative Mathematics & Science with Technology Program (LIMST)

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The program began on June 24 with 16 students and two parents attending the Summer Academy. Students were given diagnostic examinations in mathematics to determine their skill levels; the first 4 days were devoted to mathematics. The Saturday session was divided between mathematics and computer technology. The following 2 weeks, the students were split into two groups. Each group received 2 hours of mathematics and 2 hours of English. Each week, the group sessions began with diagnostic examinations in mathematics and writing skills in English, which also included writing mathematics terminology. Computer technology was taught on Saturdays for 6 hours.

In addition, the students received instruction and guidance in developing "good" study habits, learning skills and time management. Science was taught Thursday and Friday to a group of students who had expressed a need to receive instruction and learn techniques in the field.

The results of the Summer Academy were as follows. In mathematics, the SAT practice test was given, with the average score being 12 out of 50. The instructor developed a second diagnostic test, and the average test result was 39 out of 181. This test consisted of basic math addition, subtraction, multiplication, division, the changing of decimals to fractions and fractions to decimals, the determination of perimeters, and the calculation of area. The majority of students were at the basic mathematics level, even though almost all will be placed in algebra or geometry during the academic year.

In terms of science, only four students knew any basic science. By the end of the Summer Academy, 75 percent of these students had a working knowledge of the digestive tract, the necessary elements for living organisms, and an introduction to environmental science, ecology, and related topics. In technology, only five of the 16 students had some working knowledge of the computer. Three of these five were able to perform elementary programming and understood the basics of the computer.

Other Awards

National Hispanic University
Learning Innovative Mathematics & Science with Technology Program (LIMST)

Finally, in English, the work concentrated on reading comprehension of mathematics and science; selected literature, narrative, and critical analysis of written works were also provided. Only 38 percent of these students were at grade level. The remaining 62 percent gained self-confidence in their ability to accomplish descriptive and comprehensive writing by the end of the Summer Academy. However, their abilities and comprehension of literary analysis and their abilities to write in descriptive or narrative terms were far below grade level at the beginning of the session. They demonstrated improvement in their language skills but still fell below grade level at the end of the session.

Some major problems were the lack of 100-percent parent participation, the students' lack of self-confidence at the start of the academy, and the availability of textbooks.

New Mexico Highlands University
An Integrated Approach to Engineering Education in a Minority Community

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Overview

An outreach computer network of minority schools was created in northeastern New Mexico. Rural and urban minority schools gained electronic access to each other, to computer resources, to technical help at New Mexico Highlands University, and to the world via the Internet. The objective of this program has been to attract minority students toward engineering and the mathematical Sciences and involve them in these areas.

Enrollment Data

A total of 1,906 Hispanic children in grades K–8 were involved in Internet-based instructional programs as a result of this educational outreach effort. In addition, a total of 1,093 Hispanic high school students participated in similar programs geared to their educational level. This program also served approximately 61 other students, bringing the total to well over 3,000 students.

Accomplishments

Internet connections were installed in eight elementary schools, two middle schools, two high schools, a public library (servicing the home schooling community), and an international baccalaureate school. Internet and computer training programs for precollege teachers were presented several times each year. These trained teachers, in turn, became responsible for transmitting their Internet expertise to their colleagues and their students. In the "Advanced Internet" course, teachers created their own home pages, and in the "Internet Administration" course, selected teachers learned how to maintain their school's computer network and Internet servers.

Outcomes

As a result of this program's educational outreach activities, each school involved has taken over leases for their Internet connections. Parents at each school volunteered for community "net day" activities, and now each school involved in the program has completed wiring of all its classrooms. Furthermore, the schools have leveraged this program to secure technology improvement grants to provide each classroom with its own network-capable computer.

Appendices

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Alphabetical Index by Institution

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Historically Black Colleges and Universities (HBCU's)

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Hispanic Serving Institutions (HSI's)

California State University at Los Angeles	CA	PACE	Drs. William Taylor & Martin Epstein	84
City College of New York	NY	UNDERGRAD	Dr. Shermane Austin	135
College of Santa Fe	NM	PRECOL	Dr. Bobbie Coleman	28
City University of New York (CUNY)–Lehman College	NY	PACE	Dr. Anne Rothstein	88
Florida International University	FL	MASTAP	Dr. Carlos Brain	226
Florida International University	FL	TEACHER	Dr. Gustavo Roig	201
Hispanic Association of Colleges and Universities–University of Texas at San Antonio	TX	PRECOL	Dr. Manuel Berriozábal	34
Humacao University College–University of Puerto Rico	PR	TEACHER	Dr. Alberto Caceres	205
National Hispanic University	CA	OTHER	Dr. Riley Parker	249
National Hispanic University	CA	PACE	Dr. Raul Cardoza	103
New Mexico Highlands University	NM	OTHER	Dr. Bill Taylor	251
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New Mexico State University	NM	UNDERGRAD	Dr. Patricia C. Hynes	157
Our Lady of the Lake University	TX	PRECOL	Ms. Jean Kueker	53
Pasadena City College	CA	PACE	Dr. Joe Connor	109
St. Augustine's College	NC	PACE	Dr. Yvonne Coston	113
University of Puerto Rico at Mayagüez	PR	PAIR	Dr. Ramon E. Vasquez-Espinosa	248
University of Puerto Rico at Mayagüez	PR	PRECOL	Dr. Rafael Fernandez Sein	68
University of Texas at Brownsville	TX	PRECOL	Dr. Lawrence Lof	73
University of Texas at Brownsville and Texas Southmost College	TX	PRECOL	Ms. Olivia Rivas	70
University of Texas at El Paso	TX	PACE	Dr. Juan Herrera	116
University of Texas–Pan American	TX	UNDERGRAD	Dr. William C. Shockley, Jr.	178
University of Texas at San Antonio	TX	PRECOL	Dr. Manuel P. Berriozábal	75
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